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An Examination of the Relationship Between School Climate, Self-Determined Academic Motivation, and Academic Outcomes Among Middle and High School Students

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The purpose of this study was to explore connections among student perceptions of specific school climate-factors, self-determined academic motivation, and academic outcomes in a sample of middle and high school students (sixth through eleventh grade). Structural equation modeling techniques were used to identify meaningful grade specific associations within a sample of 2,463 students. The school climate factors of perceived teacher support, peer support, and school bullying emerged as the most salient school climate-based predictors of academic motivation factors. Perceived teacher support positively predicted academic competence and relatedness, whereas school bullying negatively predicted relatedness. Student academic competence, in turn, was found to negatively predict amotivation and to positively predict of GPA, after controlling for previous standardized test scores. Results were found to be consistent across grades. The implications of these findings in regards to school stakeholder practices and future research directions within the school climate and academic motivation literature bases are discussed.

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An Examination of the Relationship Between School Climate, Self-Determined Academic Motivation, and Academic Outcomes Among Middle and High School Students

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"I learned this, at least, by my experiment: that if one advances confidently in the direction of his dreams, and endeavors to live the life which he has imagined, he will meet with a success unexpected in common hours. He will put some things behind, will pass an invisible boundary; new, universal, and more liberal laws will begin to establish themselves around and within him….In proportion as he simplifies his life, the laws of the universe will appear less complex, and solitude will not be solitude, nor poverty poverty, nor weakness weakness. If you have built castles in the air, your work need not be lost; that is where they should be. Now put the foundations under them." - Henry David Thoreau, Walden

My name is on the front of this dissertation and that is an inaccurate representation of this work. This dissertation stems from the influences of the family, friends, and educators who have, over the past 28 years, been at the epicenter of my professional and personal growth. As a result of our interdependence, the pages that follow are all of ours.

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As I reflect on 20 years of school, I know that fascination with connection, in its various forms, has been the driving force of my life. I consider the infinite string of connections – of hours studying, of conversations, of relationships, of moments painful and pleasant, of walks in nature - that have led me to now. I am aware of the beauty of this complexity and my interrelation with all things without understanding it. *How* and *why* things are blossoms into a joyful fascination *that things are.* For all of those, alongside me, on their journey to remember again, again, and again, their inherent relation to all things, to those on their journey to return home…I dedicate this dissertation to you.

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CHAPTER I

Introduction and Review of the Literature

Despite a well-established evidence base linking higher levels of student academic motivation to positive school outcomes, research suggests that academic engagement and motivation decrease as students progress through the middle and high school grades (Otis, Grouzet, & Pelletier, 2005; Lepper, Corpus, & Iyengar, 2005). For example, a recent study estimated that as many as one in five high school students in Connecticut were found to be either "disengaged" (e.g., had less than 85% attendance, two or more behavioral suspensions or expulsions, or had failed two or more courses) or "disconnected" (e.g., were no longer enrolled in school despite being 21 or under) during the 2014-2015 school year (Ernst & Young LLP & Dalio Foundation, 2016). Similar statistics concerning student engagement have been reported in several other studies (Fredricks, Blumenfeld, & Paris, 2004; Skinner, Furrer, Marchand, & Kindermann, 2008) and these results have been generally consistent with findings across a more general body of literature related to student academic motivation (Gottfried, Fleming, & Gottfried, 2001; Gillet, Vallerand, & Lafreniere, 2012). That is, studies comparing students using both cross-sectional (across grades) and longitudinal (across time) approaches have consistently found that students in later grades report lower levels of academic motivation (Gillet et al., 2012; Lepper et al., 2005; Otis et al., 2005).

Overall, results suggesting that student academic motivation decreases over time are concerning given that higher levels of student academic motivation are associated with more positive academic and behavioral outcomes such as increased student GPA and higher standardized test scores (Lepper et al., 2005; Otis et al., 2015), decreased student intentions to dropout, and higher rates of school attendance (Guay & Vallerand, 1996; Otis et al., 2015).

Although identifying factors of influence on academic motivation within middle and high school settings is essential for better understanding declines in student motivation, research has predominantly focused on student perceptions of relationships with specific teachers and/or other individual classroom specific factors (Guay, Ratelle, & Chanal, 2008; Pintrich, 2003; Urdan & Shoenfelder, 2006). As such, there is a lack of research examining the influence of more general, student school-level perceptions (e.g., school safety/bullying, respect for differences, generalized teacher/peer support) on levels of academic motivation. Understanding the influence of these more generalized school-level factors on student motivation and academic outcomes may be particularly important to study at the middle and high school level given that students in these settings typically interact with numerous teachers across multiple classrooms and operate within a larger network peers. Furthermore, because existing studies have predominantly focused on either middle or high school samples in isolation, there is a lack of research assessing the influence of these factors across both the middle and high school levels. The purpose of this study was to address these limitations by exploring how student perceptions of various school climate factors relate to constructs of self-determination theory-based academic motivation to ultimately influence student academic outcomes. The results of this study were intended to help illuminate salient predictors of student academic motivation and outcomes in order to facilitate areas which may be promising for future research and intervention.

Academic Motivation

To date, several predominant theories provide a framework for the study of student academic motivation. Three of the most notable theories which have been applied to research within school settings are self-determination theory (SDT; Deci & Ryan, 1985), social-cognitive theory (Bandura, 1986), and achievement goal theory (Dweck & Leggett, 1988). Though each of

these theories takes a unique approach to explaining motivated behavior, all do so by considering the interplay between person-specific and environmental factors (person-in-context; Urdan & Shoenfelder, 2006). In explaining the primary factors driving motivated behavior, social-cognitive theory emphasizes self-efficacy, or an individual's belief that they can be successful when engaging in particular tasks, whereas achievement goal theory highlights student self-created goal structures or the reasons as to why individuals engage in particular tasks as the primary driving force. Self-determination theory (SDT; Deci & Ryan, 1985) asserts that innate volitional drives as well as the extent to which environments meet individual needs for autonomy, competence, and relatedness are the primary drivers underlying particular forms of motivated behavior. Over the past two decades researchers have increasingly become interested in the extent to which motivation theories, particularly self-determination theory and social cognitive theory, differentiate from one another.

In particular, a theoretical piece by Irvine (2018), discusses similarities and differences between predominant motivation theories while mapping each theory on a visual grid for ease of comparison. As discussed by Irvine (2018), although there are similarities among the constructs of various motivation theories, each theory subscribes more specifically to particular factors as driving motivated behavior. For example, both the constructs of self-efficacy and growth mindset which stem from social cognitive theory and achievement goal theory respectively, suggest that motivated behavior is primarily driven by high levels of student expectancies (e.g., beliefs about probability of success) and is more intrinsically focused (self-perceptions based) versus extrinsically focused. In comparison, constructs of self-determination theory are said to be more liberally influenced by student expectancies and task values as well as by both intrinsic and extrinsic factors (Irvine, 2018). In further drawing distinctions between tenets of self-

determination theory and social cognitive theory, it has been discussed that self-efficacy tends to relate to ones perceived ability to complete the specific task elements (e.g., I can ask for help) that are ultimately required to bring about a given outcome (e.g., complete assignment) without an overt focus on expected outcomes (e.g., actual task completion) (Bandura, 1997; Rodgers, Markland, Selzer, Murray, and Wilson, 2014). In comparison, the construct of academic competence within the self-determination theory framework, assesses one's self-beliefs about the ability to more generally complete a task (e.g., I can successfully complete the assignment vs. I can ask for help) with more of an explicit focus on task outcomes (Deci and Ryan, 2000; Rodgers et al., 2014).

Beyond discussion of theoretical differences, over the past decade some research has been conducted to assess the extent to which self-determination theory and social cognitive theory constructs differentiate. Confirmatory factor analysis results from few existent studies which have been conducted primarily in the health behaviors field provide some evidence to suggest that perceived competence and self-efficacy factors are conceptually distinct, however, it is likely that more research, particularly comparing these theories within the educational context are needed to better understand the extent to which these motivational constructs differentiate from one another (Rodgers et al., 2014; Senecal, Nowen & White, 2000). In the present study, self-determination theory constructs were utilized as the primarily framework to conceptualize student motivation. Self-determination theory was deemed as highly applicable to the school based context and to school based factors for a number of reasons.

Self-Determination Theory

First, in explicitly identifying autonomy, competence, and relatedness as the three basic psychological needs underlying motivated behavior, SDT provides an applicable context for

assessment of environmental factors. In this sense, school-based factors which fulfill these basic psychological needs can be theoretically considered to be more effective in promoting particular student motivation orientations. Second, by distinguishing between multiple subtypes of motivation which reflect various reasons as why individuals engage in particular behaviors, SDT offers insight beyond simply one's level of motivation (e.g., higher or lower motivation), and thereby provides additional detail and potentially more useful insights regarding the nature of motivated behavior (Deci & Ryan, 1985). Finally, because SDT is not explicitly focused on how students frame particular tasks or goals, but rather on the extent to which environments successfully meet student needs, the SDT framework can be applied broadly across settings and context levels (e.g., at the classroom or school level). Given these factors and an established literature base connecting self-determined behavior to a variety of student outcomes, motivation is conceptualized though a SDT framework for the purposes of this study.

Motivation orientations. Self-determination theory categorizes motivated behavior as either *Intrinsic* or *Extrinsic.* Individuals who are more intrinsically motivated tend to view activities as ends in themselves and thus engage in these activities out of personal interest or enjoyment (Ryan & Deci, 2000). Individuals who view activities as means to an end, and thus engage in these activities for the purpose of obtaining a particular, separate outcome (e.g., a reward, approval, future outcome, etc.), are considered extrinsically motivated (Ryan & Deci, 2000). Finally, SDT refers to the absence of motivation, or an inability to recognize value in an activity, as a state consistent with being *Amotivated.* Rather than consisting of separate domains, SDT postulates that all motivated behavior falls on a continuum between that which is *Autonomous* or more intrinsically motivated and that which is *Controlled* or more extrinsically motived (See Appendix A: adapted from Ryan & Deci, 2000). Individuals are considered to be

more self-determined to the extent in which they manifest more autonomous or intrinsic orientations (Ryan & Deci, 2000).

Regarding the relationships between intrinsic motivation, extrinsic motivation, and amotivation, numerous studies have reported negative correlations between intrinsic and amotivation and extrinsic motivation and amotivation, while reporting positive associations between extrinsic motivation and intrinsic motivation (Alivernini & Lucidi, 2011; Cokley, 2000; Ratelle, Guay, Vallerand, Larose, & Senécal, 2007). As noted by Ryan and Deci (2000) individuals may manifest varying motivational orientations in differing settings, and these motivations may change in response to a variety of contextual factors. Research over the past few decades has linked differing motivation orientations to a variety of student outcomes.

Motivation orientations outcome research. In evaluating student motivation orientations within school settings, research suggests that student motivation orientations may be likely to change as student's progress through school grades (Otis et al., 2005; Lepper et al., 2005). For example, in a study of elementary and middle school students by Lepper, Corpus, and Iyengar (2005), intrinsic motivation was found to decrease steadily from third to eighth grade. These results were found to be consistent with those from a study by Corpus, McClintic-Gilbert, and Hayenga (2009) which similarly used a sample of elementary and middle school students and reported declines in intrinsic and extrinsic motivation when comparing students in third through eighth grade. Findings from a study by Otis, Grouzet, and Pelletier (2005) further supported these results in evaluating students in eighth through tenth grade, reporting that student levels of intrinsic motivation decreased during each subsequent year. Furthermore, these findings are consistent with those reported in other studies which utilized competing theories of student motivation (e.g., self-efficacy theory, expectancy-value theory), suggesting that there is a general

trend for student engagement and motivation to decrease at the secondary level (Caprara et al., 2008; Wigfield & Eccles, 2002). This pattern of results is particularly concerning given that a number of studies suggest that intrinsic motivation is associated with a variety of positive student outcomes, whereas both extrinsic and amotivation are associated with negative student outcomes (Vansteenkiste, Lens, & Deci, 2006; Vallerand, Fortier, & Guay, 1997; Niemiec & Ryan, 2009).

Once such study by Lepper et al. (2005) reported that higher levels of intrinsic motivation amongst elementary and middle school students were found to be positively associated with both GPA (r=.34) and standardized test scores (r=.27). A study by Otis et al. (2005) reported similar results amongst a sample of students in eighth through tenth grade, finding that rates of intrinsic motivation were associated with more positive educational adjustment (mean intrinsic r = .34) in the form of higher rates of homework completion, decreased intentions to dropout and higher school attendance. In the same study, higher levels of student amotivation were found to be negatively associated with educational adjustment across all grades (mean r= -.50). Similarly, in exploring the relationship between high school students' levels of autonomous motivation and behavioral outcomes, Guay and Vallerand (1996) reported that higher levels of autonomous motivation (e.g., higher levels of intrinsic motivation) were associated with lower reported dropout intentions (β= -.67) which, in turn, predicted actual dropout behavior (β=.24) one year later (Guay & Vallerand, 1996). Furthermore, results from a meta-analysis of 18 studies examining intrinsic motivation over a one year period concluded that high school student intrinsic motivation remained significantly associated with academic achievement (GPA; Cohen's d = .27) after controlling for baseline achievement (GPA; Taylor et al., 2014). Results also suggested that extrinsic motivation had a moderate, negative association with academic achievement (Cohen's d = -22) whereas amotivation displayed a more substantial negative

association with academic achievement (Cohen's *d* = -.61; Taylor et al., 2014). Given established connections between student self-reported motivation orientations and a number of school-based academic and behavioral outcomes, it is important to consider further how contextual, school-based factors potentially dictate the formation of specific motivational orientations.

Basic psychological needs theory. In particular, SDT asserts that individuals are poised to develop and sustain more internalized motivation orientations and thus become more autonomously oriented within environments that fulfill their *basic psychological needs*. Basic psychological needs theory (BPNT) defines these as the need for autonomy, competence, and relatedness (See Appendix A: adapted from Ryan & Deci, 2000). Contexts which provide choice and allow for individuals to perceive that their actions are self-based or volitional in nature are considered to meet needs for *autonomy*. The need for *competence* reflects an individual's intrapersonal perceptions of their capability in performing a variety of tasks in order to bring about intended outcomes or to successfully reach particular goals. Finally, the need for *relatedness* refers to the desire for individuals to perceive a sense of belongingness or connectedness with others (Ryan & Deci, 2000).

As discussed by Reeve (2012), BPNT contributes to SDT in several important ways. First within SDT, BPNT postulates that the innate desire for individuals to fulfill basic psychological needs is the initial driving force underlying motivated behavior, thereby emphasizing the active role of self-perceptions within the motivation process. Second, to the extent in which contexts meet basic psychological needs, BPNT provides a justification as to why individuals may display varying degrees and types of motivational orientations across settings. Finally, in explicitly identifying autonomy, competence, and relatedness as the three basic psychological needs,

BPNT provides a useful framework for the development and testing of hypotheses regarding how particular environmental factors are likely to influence student motivation (Reeve, 2012). In considering this third point, numerous studies have used a BPNT framework to investigate how environmental factors interact with student perceptions and motivational outcomes (Blanchard & Vallerand, 1996; Soenens & Vansteenkiste, 2005).

***Basic psychological needs theory outcome research*.** Research related to BPNT has historically focused on factors that influence student perceptions of autonomy, resulting in less substantial research base related to the competency and relatedness domains (Ryan & Deci, 2000). Specifically, investigations of school-based environmental factors have generally examined the impact of specific *autonomy-supportive* vs *controlling* classroom contexts. Contexts that are autonomy-supportive provide outlets for student choice, are receptive of student needs, and value student points of view. In contrast, controlling contexts are defined as having rigid rules, as limiting student choice, and are generally considered to be overtly controlling (Chang, Fukuda, Durham, & Little, 2017; Ryan & Deci, 2000). Research over the past two decades has provided support for BPNT and SDT in finding that autonomy-supportive classrooms are more likely to fulfill student basic psychological needs and to ultimately promote more autonomous motivation types (Chang et al., 2017; Ryan & Deci, 2000).

For example, in a study by Soenens and Vansteekiste (2005), adolescents' perceptions of autonomy-supportive teaching (e.g., that teachers provide choices and options) predicted increased school (β=.36) and job-search related self-determined motivation (β= .42) and these factors were, in turn, were associated with both higher GPA (β=.18) and a variety of adaptive job-related behaviors (e.g., job exploration and commitment; β =.18). Additionally, results from a study by Gillet et al. (2012) of a large sample of students aged nine through seventeen, found

student perceptions of teachers as autonomy supportive (e.g., teachers giving students the opportunity to make decisions) to positively predict levels of intrinsic motivation (β = .27) and to negatively predict amotivation (β= -.16). Other studies have reported similar results, suggesting that autonomy supportive teaching practices are positively associated with student self-perceptions of competence (β=.33; Guay & Vallerand, 1996) and with behavioral engagement (β=.21; Skinner et al., 2008). As noted previously, although studies have predominantly focused on student self-perceptions of autonomy, a smaller branch of related research has examined the influence of student perceptions of competence and relatedness.

In particular, studies have reported significant positive associations between student self-reported levels of academic competence and both self-determined school motivation (β=.33; Guay & Vallerand, 1996) and behavioral engagement (β=.27; Connell, Halpern-Felsher, Clifford, Crichlow, & Usinger,1995). Results from a study by Connell et al. (1995), which evaluated perceptions and outcomes among a sample of middle and high school students, indicated that female perceptions of competence at time one negatively predicted time two "educational risk" (β=-.80), which reflected a number of academic and behavioral factors including student attendance, standardized test scores, number of suspensions, and failed courses. Additionally, a study by Marchant, Paulson, and Rothlisberg (2001) of fifth and sixth grade students found that higher student reported school competence scores, which represented student perceptions that they have the ability to do well in school, were found to predict increased levels of student academic achievement (GPA; β= .26). Beyond these findings, competence has been discussed as related to the more widely studied construct of student self-efficacy (Ryan & Deci, 2000). A strong body of research suggests that student self-efficacy is

positively associated with student engagement, academic achievement, and likelihood of school persistence (Linnenbrink & Pintrich, 2003; Wigfield, Eccles, Roeser, & Schiefele, 2008).

Although studies evaluating student relatedness through a SDT framework are sparse, a small number of studies have linked student perceptions of relatedness amongst peers and teachers to positive student outcomes. For example, Furrer and Skinner (2003) reported that perceptions of relatedness to classmates amongst a sample of third through sixth grade students predicted student self-reported behavioral (β=.42) and emotional (β=.50) engagement. Results from another study of high school students by Legault, Green-Demers, and Pelletier (2006) indicated that higher student ratings of teacher and peer affiliation independently predicted lower levels of student self-reported amotivation (β = -.31). Beyond a self-determination motivation framework, a more general research base provides support for student perceptions of belongingness as well as social support from teachers and peers as associated with more positive motivational and academic outcomes (Jia et al., 2009; Wentzel, Battle, Russell, & Looney, 2010). Aside from these studies, research specifically examining student perceptions of relatedness and competence within a SDT framework has remained limited. These limitations, in conjunction with a dearth of studies exploring connections between basic psychological needs, academic motivation orientations, and student outcomes, have further hindered understanding of the utility in applying student SDT-based academic motivation frameworks within educational settings. These gaps in the SDT research mirror more general trends within the motivation literature regarding contextual determinants of student academic motivation.

Limitations in self-determination theory academic motivation research.

Academic motivation research has primarily focused on the examination of the impact of specific classroom-level factors focused at particular grade levels (e.g., middle or high school),

thereby limiting knowledge regarding the impact of more general school-level factors (e.g., perceptions of school safety, overall teacher/peer support, respect for differences, etc.; Urdan & Shoenfelder, 2006; Pintrich, 2003). Among the small group of studies that have investigated school-level factors and student academic motivation, most have primarily focused on a single factor such as teachers as supportive (Alivernini & Lucidi, 2011; Skinner et al., 2008), parents as supportive (Guay & Vallerand, 1996), or students' perceptions of relatedness amongst peers (Furrer & Skinner, 2003). As a result, single studies have typically been unable to more broadly explore impacts of and relationships among multiple school-level factors. An additional fundamental limitation to current academic motivation research is the absence of studies which have evaluated SDT motivation constructs across grade levels, particularly the middle and high school grades. Given that only a small number of studies have utilized an SDT framework to evaluate student functioning across both the elementary and middle (Connell et al., 1995, Corpus et al., 2009; Lepper et al., 2005) or middle and high school grade levels (Gillet et al., 2010), understanding of potential grade level differences in these factors remains limited. Finally, because studies have often used various motivational theories to frame student academic motivation as opposed to solely an SDT-based approach, information regarding the impact of specific school-level factors on student basic psychological needs and motivational orientations continues to remain limited. Despite these overall limitations, the few studies that have employed an SDT framework have yielded valuable insights.

Current motivation orientations and basic psychological needs research. For example, one such study of tenth grade students by Guay and Vallerand (1996) found that perceived teacher autonomy support predicted student perceived academic autonomy (β = .22) and that academic autonomy, in turn, predicted student self-determined school motivation (β =

.68). These results are important in that they highlight the connection between student perceptions of school-level factors and student outcomes via motivational pathways. However, two primary limitations to this study were the exclusion of the basic psychological needs relatedness component, and the absence of additional potentially meaningful school-level factors such as peer relations (Guay & Vallerand, 1996). In addition to these findings, a recent study by Joe, Hiver, and Al-Horrie (2017) reported that secondary student perceptions of the classroom social climate (e.g., mutual respect and teacher academic and emotional support) predicted a generalized basic psychological needs composite factor (β = .54), and that this factor in turn predicted student intrinsic motivation (β = .58). Results from this study suggest that student self-perceptions (basic psychological needs) play a role in linking contextual variables (classroom social climate) to motivation orientations (intrinsic motivation). However, interpretation of the results, specifically the ability to draw independent conclusions regarding each of the basic psychological needs factors, was limited due to researcher use of a basic psychological need composite which combined the autonomy, competence, and relatedness factors. Additionally, within this study, all variables were rooted within a specific classroom context as opposed to at the more general school-level, the study of which may be more useful when attempting to better understand the overall experiences, perceptions, and motivations of middle and high school students. A third study by Chen and Jang (2010) reported similar results among college students in finding that a composite score which consisted of student perceptions of autonomy, competence, and relatedness was found to mediate the relationship between contextual support (teacher autonomy and competence support; β = .87) and self-determined motivation (β =.15). This study was subject to similar limitations to Joe et al. (2017) in that the students/context were specific to a single online college course and composites were used to qualify basic needs

relationships as opposed to individual evaluation of the autonomy, competence, and relatedness variables.

In summary, gaps in the current understanding of the influence of school-based factors on student motivation are, in part, a reflection of limitations in the SDT literature base which has predominantly focused on connections between teacher autonomy-supportive practices and student perceptions of autonomy within specific classrooms for specific grade levels. A more comprehensive understanding of factors which are associated with declines in secondary student motivation has been further limited by a lack of research exploring the influence of various school-level factors on student basic psychological needs and how these needs, in turn, impact motivation orientations and outcomes. As noted, student perceptions of school-level factors, as opposed to classroom-specific factors, may be particularly important to understand at the middle and high school levels given that young-adolescent and adolescent students typically rotate between numerous classrooms and interact with a variety of teachers and larger volumes of peers. In turn, an increased understanding of the influence of these secondary school-level factors may help to guide future research and intervention efforts. As a primary method used by schools to collect school-wide data regarding student perceptions, school climate assessment represents a promising area for future exploration of school-level impacts on student basic psychological needs and academic motivation.

School Climate

Broadly considered the quality and character of the school environment, school climate encompasses school norms, values, internal relationships, teaching practices, and organizational structures (National School Climate Center, 2017). These aspects can be subdivided into the

major dimensions of *Safety*, *Relationships*, *Teaching and Learning*, and *Environmental-Structural* factors (Cohen, McCabe, Michelli, & Pickeral, 2009).

Safety refers to student perceptions of physical and emotional security within the school environment as well as school order and discipline (Wang & Degol, 2016). Of particular importance within the safety dimension are student experiences of bullying and victimization. *Teaching and Learning* reflect the overall quality of school instruction as well as specific instructional practices such as the use of varied teaching methods and the fostering of the innate importance of learning (Cohen et al., 2009). *Relationships* refer to the quality of teacher to student and peer to peer relationships, connectedness with individuals within the school, and general respect for differences. Finally, *Environmental-Structural* factors refer to the physical aspects of the school such as school cleanliness, space, size, and the presence of curriculum-based and extracurricular opportunities (Cohen et al., 2009). Taken together, these aspects of the school environment have been linked to a variety of student behavioral and academic outcomes within the school climate literature.

In particular, research suggests that student perceptions of a positive school climate are associated with reduced reports of overt and relational victimization (β =.25, β =.17; Goldstein, Young, & Boyd, 2008), lower rates of self-reported externalizing and internalizing problems (β =.21, β =-.17; Kuperminc, Leadbeater, Emmons, & Blatt, 1997), and lower rates of student dropout (β =.21; Cornell, Gregory, Huang, & Fan, 2013). Additionally, schools reporting higher levels of school cohesion (e.g., sense of belongingness, positive interactions, etc.) have been shown to also report higher academic achievement scores (β =.21; Stewart, 2008). Despite a solid research base connecting the previously discussed elements of school-climate to positive student outcomes, the literature base continues to remain restricted due to a lack of empirical

research and a limited number of studies exploring the influence of other potentially meaningful school-based constructs.

Limitations in School Climate Research

As noted by Thapa, Cohen, Guffey, and Higgins-D' Allessandro (2013), there is limited understanding regarding *how* aspects of school climate ultimately serve to influence student outcomes. Though some studies have more explicitly explored these connections (Loukas, Suzuki, & Horton, 2006; Wilson, 2004), additional research examining meaningful factors which might serve to drive or mediate relationships between school-climate factors and outcomes is needed. Additionally, as discussed by Wang and Degol (2016), research designs often address single facets of student perceived school climate (e.g., teacher-student relationships) or incorporate results from school climate measures and other assessments administered at a single time point. As a result, temporal precedence is often violated which hinders the ability to further understanding regarding the impact of and relationship between multiple factors as well as how they might change overtime. Finally, given that research has primarily focused on connecting school climate factors to student academic **(**e.g., GPA, standardized test scores**)** and behavioral outcomes (e.g., suspension, dropout, and aggression), studies explicitly examining relationships between school climate and other school-related constructs such as academic motivation continue to remain sparse. In general, the elements that comprise the overall construct of school-climate (e.g., perceptions of school safety, relationships, etc.) have been primarily conceptualized based on research conducted over the past three decades (Cohen et al., 2009). As such, most research regarding the influence of school-based factors on student motivation has been rooted within the more dated motivation literature which, as previously discussed, is subject to several limitations. Despite sparse research investigating connections between school-climate

factors and tenets of self-determined motivation, recently researchers have increasingly discussed the potential benefit of connecting these domains.

School climate and self-determination theory. Specifically, in discussing connections between student perceptions of school climate and basic psychological needs, Wang and Holcombe (2010) noted that students' positive relationships with teachers and peers are likely to support student needs for relatedness. As noted by Marchant and colleagues (2001), student perceptions of a supportive social environment from teachers and peers are likely to foster the development of higher levels of academic self-competence. Furthermore, perceptions of school as safe and rule-based are likely to set the foundation for students to successfully accomplish school-based tasks and thereby facilitate the need for competence (Wang & Holcombe, 2010). Regarding student needs for autonomy, autonomy-supportive classroom practices relate directly to the school climate domain of teaching and learning and, in particular, teachers deliberately balancing their level of support for students (Urdan & Shoenfelder, 2006). Though research connecting these domains has primarily remained theoretical, with the exception of research specific to autonomy supportive/controlling classroom practices, a small number of studies have helped to more explicitly build a foundation for connecting school climate and SDT factors.

In particular, a study by Eccles et al. (1993) evaluated the impact of a variety of teacher discipline/control practices, opportunities for student decision making, and teacher-student relationships on student levels of motivation during the transition from elementary to middle school. In finding that decreases in student motivation mirrored students entering more controlled middle school environments where the quality of teacher-student relationships declined, the authors suggested that student motivation changes were the result of "the mismatch between students' needs and the opportunities afforded to them in traditional middle school

grades" (Eccles et al., 1993, pg. 567). Other studies have found similar results, most commonly reporting that teacher-student relationships/emotional support are positively associated with motivational constructs such as student academic efficacy (β= .30; Patrick, Ryan, & Kaplan, 2007), mastery goal beliefs (β= .35; Patrick et al., 2007), and school interest (β= .33; Wentzel, 1998). Though these studies did not use SDT to conceptualize student motivation, their results, and in particular the conclusions drawn by Eccles et al. (1993), clearly relate to BPNT in stressing the importance of environments in meeting innate student needs in order to foster student motivation.

In terms of studies utilizing SDT components, one such study by Joe et al. (2017) found significant associations between high school student perceptions of school climate factors (mutual respect, teacher academic and emotional support), basic psychological needs, and student willingness to communicate within class. Of particular importance within this study were results which suggested that, after testing numerous competing models amongst variables (i.e., school climate factors predicting basic psychological needs vs. basic psychological needs predicting school climate factors), school climate predicting basic psychological needs served as the most appropriate model in accounting for the variance in student outcomes. Another study by Young-Jones, Fursa, Byrket, and Sly (2015) more explicitly examined the student school climate domain of safety in investigating how high school and college student reports of bullying were related to basic psychological needs and academic motivation. Results indicated that students who endorsed being previously or currently bullied reported lower autonomy and competence scores as well as lower levels of academic motivation. Although these researchers did not evaluate a range of school climate factors, these results emphasize the importance of student

experiences related to school climate, particularly bullying, in impacting basic psychological needs and subsequent motivation related outcomes.

Finally, a study by Marchant et al. (2001) linked school climate factors with fifth and sixth grade students' perceived school competence and academic outcomes. Specifically, researchers found that student perceptions of a supportive social environment (e.g., relationships as supporting academic goals) and teacher responsiveness (e.g., teacher interest in and support of students) positively predicted increased school competence (β=.15, β=.28) which, in turn, positively predicted GPA (β=.26). This study is unique in that it examined the predictive power of more generalized school climate factors within the "school atmosphere" and linked these factors to school competence and outcomes. The study of a limited range of student grades (e.g., fifth and sixth) serves as a primary limitation to this study and a majority of the studies previously discussed thereby limiting the ability to identify, compare, and draw conclusions regarding grade specific and/or level specific (e.g., middle vs. high school) associations in school climate, academic motivation, and outcome variables.

Conceptual model summary and research conclusions

In light of these various limitations, the present study sought to examine relationships between various school climate factors, tenets of SDT-based academic motivation (basic psychological needs, motivation orientations), and student academic outcomes. The primary conceptual model illustrating pathways between these variables is summarized in Figure 1. Figure 2 displays the previously discussed, most rigorously supported pathways between factors (pathways with β values greater than or equal to .25). Regarding school climate factors, Figure 2 suggests that the relationship between teacher support and the student basic psychological needs of autonomy, competence, and relatedness currently has the most research support, followed by

the relationship between peer support and autonomy and relatedness. There has been limited study of the impact of school bullying on student basic psychological needs. Of the basic psychological needs factors, despite a majority of research assessing the impact of student perceptions of autonomy on academic motivation, at least one study has demonstrated relationships between competence and intrinsic motivation (Vallerand, 1996) and relatedness and amotivation (Legualt et al., 2006) with an effect size greater than .25. Finally, research has linked both intrinsic motivation (Taylor et al., 2014) and amotivation (Legault et al., 2006; Taylor et al., 2014) to student GPA with an effect size greater than .25, however, research exploring the impact of extrinsic motivation has primarily remained correlational in nature (Lepper et al.,2005; Otis et al.,2015).

Taken together, existing studies within the academic motivation and school climate literature bases provide preliminary evidence to suggest that there may be important associations between student perceptions of school climate and SDT-based academic motivation (Guay et al., 2008; Wang & Degol, 2016; Wang & Holcombe, 2010). However, given limited work to date concurrently examining both, additional studies are required to more holistically understand the relationship between student perceptions of school climate, academic motivation, and outcomes across a range of grade levels in order to further understanding of factors which influence student motivation levels and to inform potential directions for school-based intervention.

Purpose of the Study

Research suggests that student engagement and academic motivation decrease as students enter the middle and high school grades (Otis et al., 2005; Gillet et al., 2012). Current understanding of factors that influence this change in motivation, particularly those that may be malleable to intervention, continues to remain limited. Research focused on student academic

motivation has predominantly explored connections between student perceptions of teacher practices within individual classrooms, leaving more limited knowledge regarding the influence of other factors (e.g., peer-relationships) as well as the impact of more general, student school-level perceptions (e.g., school safety, respect for differences, peer support; Fredricks et al., 2004; Urdan & Shoenfelder, 2006). These school-level perceptions are often conceptualized as elements of school climate, and have been well connected to a variety of academic and behavioral outcomes (Thapa et al., 2013). Further examination of associations between school-climate factors and student academic motivation may be particularly important in informing future research directions and ultimately directions for more universal intervention initiatives at the secondary level given that students in these grades typically interact with multiple teachers and with wider groups of peers.

Given that calls for further exploration into connections between school climate and academic motivation are relatively recent, the literature has remained largely theoretical (Urdan & Shoenfelder, 2006; Wang & Degol, 2015), with the few existing studies subject to design limitations. The purpose of this exploratory study is to expand on previous literature by investigating the influence of student perceptions of various school climate factors on SDT-based academic motivation constructs and academic outcomes across a wider range of student grades. Research questions are as follows:

Among middle and high school students:

1. To what extent do school climate factors, student perceptions of basic psychological needs, and academic motivation orientations, predict (directly or indirectly) student academic outcomes, when accounting for previous academic achievement (previous standardized test scores)?
2. Are relationships between variables consistent across grade levels?

CHAPTER II

Method

Setting and Student Population

This study involved partnership with a large, diverse school district in the Northeast. The student population from which the sample was drawn included sixth through eleventh graders from four schools: two middle schools (sixth through eighth grade) and two high schools (ninth through eleventh grade) for the 2017- 2018 school year. Based on district provided data, the total student population for the 2017-2018 school year consisted of 3,153 students, with 1,519 (48.2%) students coming from middle schools and 1,634 (51.80%) students coming from high schools. Within this population, 1,895 (51.89%) students identified as male, 2171 students (68.86%) were representative of a minority ethnic group (e.g., any ethnic group other than White), and 551 students (17.5%) were estimated to be receiving special education services.

Measures

School climate. Student perceptions of school climate were investigated using the *The Meriden School Climate Survey – Student Version* (MSCS-SV: Gage, Larson, & Chafouleas, 2016). The MSCS-SV is a confidential survey administered on an annual basis within the district of study in order to evaluate student perceptions of a variety of school-level factors. The survey consists of 48 items which are measured using two five point likert-type scales from 1-*Never* to 5-*Always* and 1-*Strongly Disagree* to 5- *Strongly Agree*. Although the MSCS-SV forms seven factors representing various student perceptions in the school and home context (e.g., Parental Values/Support for School), this study was primarily concerned with factors that were directly school based. As such, the four school-based climate factors (27 items) that were used for analysis within this study included: *Teacher Support* (13 items, e.g., "At my school, there is a

teacher or other adult whom I can trust"), *Perceived School Bullying/School Safety* (7 items, e.g., "I feel safe in school"), *Respect for Differences* (7 items, e.g., "A persons skin color can cause problems at my school"), and *Peer Support* (4 items, e.g., "At my school, I have a friend who I can really trust").

Psychometric properties of the MSCS-SV have been evaluated in previous research. Specifically, results from a confirmatory factor analysis (CFA) process by Gage, Larson, and Chafouleas (2016) indicated acceptable model fit values for the comparative fit index (CFI; value =.911), the standardized root mean square residual (SRMR; value = .062) , and the a root mean square-error of approximation (RMSEA value =.046; Hu & Bentler, 1999), after all within-factor items were correlated. Reliability estimates (alpha values) across all but one of the seven factors, (*Aggression Towards Others*=.69) were found to be above α=0.70, suggesting acceptable reliability (Gage et al., 2016).

To better understand the measurement error implications associated with testing a four-factor school-based model of school climate (e.g., *Teacher Support, Perceived Bullying/School Safety, Peer Support, Respect for Differences*) with the population of interest (6^{th} – 11^{th} grade students), a series of models were tested using data provided by the lead author from the initial MSCS-SV reliability/validity study (Gage et al., 2016). This analysis consisted of conducting a CFA and engaging in a model respecification process. Results replicated across two distinct time-points (fall and spring) suggested that a four-factor revised model of school climate served to adequately represent student data based on model fit statistics (Fall /Spring: CFI - .956/. 941, RMSEA - .047/.052, SRMR - .045/.050; Hu and Bentler, 1999). Additionally, reliability estimates (Cronbach's alpha) conducted for the four factors for students in grades sixth through

eleventh were found to be acceptable: *Teacher Support* α=.88, *School Safety/Bullying* α=.76, *Respect for Differences* α=.72, and *Peer Support* α=.76.

Basic psychological needs. Student basic psychological needs was measured based on a scale adapted from the *Basic Needs Satisfaction in General Scale* (BNSG-S; Gagne, 2003). The BNSG-S assesses an individual's general satisfaction specific to the basic psychological needs of autonomy, competence, and relatedness by asking individuals to rate how true (1-*Not true at all* to 7-*Very true),* 21 brief statements are of their life. Statements include "I consider the people I regularly interact with to be my friends" (relatedness), "I feel I am free to decide for myself how to live my life" (autonomy), and "Most days I feel a sense of accomplishment from what I do" (competence). The BNSG-S has been used in numerous studies (Conroy & Coatsworth, 2007; Niemiec, Ryan, & Deci, 2009) and its psychometric properties have been evaluated (Johnston & Finney, 2010). Specifically, Niemiec et al. (2009) found Cronbach's alpha factor reliabilities to be acceptable with values as follows: *Autonomy* α=.72, *Competence* α=.73 and *Relatedness* α=.82. In further evaluating the psychometric properties of the BNSG-S, Johnston and Finney (2010) found a reduced 16-item, three-factor solution with simplified items to best fit responses across three samples. For the purposes of this study, Johnston and Finney's (2010) adaptations to the BNSG-S were utilized to select nine items to represent the factors of student basic psychological needs within an academic setting (e.g., *Autonomy, Academic Competence, Relatedness*). Consistent with the initial scale, individuals were asked to indicate the extent to which they agreed, from 1-*Strongly Disagree* to 7 –*Strongly Agree*, to three statements across each scale (See Appendix C). Following a confirmatory factors analysis procedure (see results section), the scale was further reduced to a two factor model comprised of *Academic*

Competence and *Relatedness.* Cronbach's alpha reliability estimates for the *Academic Competence* (α = .83) and *Relatedness* (α = .84) fell within the "Very Good" range (Kline, 2016)

Academic motivation. Student academic motivation was assessed using a scale adapted from the *Academic Motivation Scale –English Version* (AMS: Vallerand et al., 1992). The 28-item AMS contains a total of seven subscales including three *Intrinsic Motivation* scales, *Identified Regulation*, *Introjected Regulation*, *Extrinsic Motivation*, and *Amotivation*. Students are asked on a 7-point likert type scale (1-*Do not correspond at all* to 7-*Correspond exactly*) to rate to what extent a series of statements correspond to their reasons for attending school. The AMS has been used across numerous studies, and has been reduced in other studies to reflect five subscales by collapsing intrinsic motivation into a single subscale (Gillet et al., 2012; Otis et al., 2006; Villacorta, Koestner, & Lekes, 2003). Internal consistency for scores on the five-factor structure ranged from adequate to good: *Intrinsic Motivation* (α=.82), *Identified Regulation* (α=.73), *Introjected Regulation* (α=.83), *Extrinsic Motivation* (α=.84), and *Amotivation* (α=.75). Items from the *Intrinsic Motivation, Extrinsic Motivation,* and *Amotivation* subscales of the AMS were adapted for the purposes of this study. Specifically, wording from these items was simplified and the AMS's 7-point likert scale was modified to assess student responses on a 1-*Strongly disagree* to 7-*Strongly agree* scale in order to better ensure age appropriateness (See Appendix D). Following a CFA process (see results section below), a final 12 item, three factor *AMS* scale was utilized for analysis. Cronbach's alpha reliability estimates for the *Inrinsic Motivation* (α = .91), *Extrinsic Motivation* (α = .85), and *Amotivation* (α = .84) factors all fell within the "Very Good" range (Kline, 2016).

Outcome data. Student GPA and standardized test scores served as the primary outcome data for the current study. Specifically, GPA and standardized test scores were collected for all

students grades sixth through eleventh. The Smarter Balanced Summative Assessment (SBAC; Smarter Balanced Assessment Consortium, 2018) was collected for grades sixth through eighth, the PSAT (College Board, 2018) was collected for students in the ninth and tenth grades, and SAT (College Board, 2018) was collected for eleventh grade students. Additionally, previous SBAC scores (scores from sixth grade) were obtained for students in the seventh and eighth grades, and previous PSAT scores (scores from eighth or ninth grade) were obtained for students in the ninth through eleventh grades. These previous scores were collected to serve as a cognitive ability covariate in the model as to better control for the potentially confounding impact of innate mental ability on student school climate, academic motivation, and outcome variables. District provided GPA data was calculated based on the six primary class categories of math, reading, writing, social studies, science, and ESOL (if applicable). Scores for both middle and high school GPA were weighted depending upon student placement in advanced placement or accelerated courses. Other administrative data collected for analysis included demographics such as student gender, grade level, school (specific school name masked), race (minority vs. non-minority), and disability status (receives special education services vs. does not receive special education).

Procedures

Data sources and collection. This study used both pre-existing and researcher provided measures collected in the spring of 2018. Regarding participant recruitment and data collection, all measures were implemented into the district's routinely administered fall and spring school-wide assessment batteries. Extant data collected during a fall 2017 assessment included results from the MSCS-SV data (48 survey items). Measures that were provided to the district and collected in the spring of 2018 included the adapted BNSG-S (9 survey items) and AMS (12 survey items) scales. The district also provided all student academic outcome data, in the form of standardized test scores (previous and current) and GPA. Following assessment administration,

all data were de-identified by the district prior to being provided to the researcher in the late spring of 2018.

Data cleaning and missing data. Following collection of all data, a number of steps were taken to prepare the data for analysis. Specifically, all data sources were first merged together in SPSS through use of a unique-ID number key variable for each student. The fully merged database contained 4,756 unique student cases indicative of students who had been enrolled at any time during the year and who had at least one data point (e.g., survey, demographic, or outcome data point) recorded by the district. Given that this number of cases exceeded the current enrollment of students in grades sixth through eleventh, data cleaning steps were undertaken to further isolate the sixth through eleventh grade sample. In assessment of missing data patterns, a large number of cases (1,629, 34.24%) were found to be completely missing data for both the fall MSCS-SV and spring BNSG-S and/or AMS measures, suggesting that students likely did not take these surveys for various of reasons (e.g., may have transferred districts or were no longer enrolled, were absent, etc.). A remaining 268 students were completely missing fall MSCS-SV data only and 27 were completely missing BNSG-S and AMS only. In addition to these groups who were completely missing data on one survey, another subset of students (n=369) had completed some items on the MSCS-SV or BNSG-S and AMS but for one of these surveys had not answered a large portion (75% or more) of items. Given that the primary goals of analysis were to assess student responses across the fall MSCS-SV and spring BNSG-S, and AMS surveys, the decision was made to delete cases in which students had answered fewer than 25% of items on either the MSCS-SV or combined BNSG-S and AMS surveys. In total, 2293 cases representing students who were completely missing responses for one or both surveys and/or who had completed one survey but had less than 25% completion of

items on another, were deleted. This resulted in a final, cleaned analysis sample of 2,463 students, which represented 78.12% of the total 2017-2018 sixth through eleventh grade district population.

Following data cleaning, the final sixth through eleventh grade cleaned sample was then evaluated for the degree to which it was representative of the population by comparing sample demographic factors (e.g., gender, minority status, school, grade, special ed. status) with district provided population data for the 2017-2018 school year (See Table 1). Chi-square analyses were conducted using R statistical programing software to assess the degree of difference between expected and observed values. Significant differences ($p < .05$) between expected and observed values for *School* were found and further examination revealed that there was overrepresentation in responses from middle school one (+6.38%) and underrepresentation in responses from high school one (-4.66%) and two (-3.47%). Differences between the expected and observed variables for all other variables were found to be non-significant ($p > .05$), suggesting consistent representation across all other factors. A relatively small observed margin of difference between population and sample characteristics for the school variable (e.g., margin of difference percentage at 6.38%) and non-significant results for all other chi-square tests suggests that the characteristics of the finalized sample are relatively consistent with those of the population.

The remaining sources of missing data within the sample, which included cases for which individuals did not answer all items but answered 25% or more of items across all surveys, were addressed using full information maximum likelihood estimation (FIML) within the Mplus (Muthén & Muthén, 1998-2017) editor platform. FIML is a model-based method which partitions raw data into subsets and uses the means, variances, and other relevant information from the existing data to estimate parameters and standard errors. This method does not rely on

deletion or the imputation of missing value and has been shown to yield less biased estimates than other classical techniques (Peters & Enders, 2002).

Analysis Plan

Structural equation modeling assumptions. Structural Equation Modeling (SEM) was used as the primary method of analysis in this study. Based on the analysis of covariances, SEM allows for researchers to test hypothesis regarding the relationships amongst several observed and latent variables. Specifically, using this technique to test the fit of conceptual models containing latent variables, which are derived from multiple indicators, reduces overall measurement error and allows for more accurate examination and estimation of effects between variables. As is the case with all methods of analysis, a number of assumptions that must be addressed in order to increase the validity of conclusions that can be drawn through SEM techniques.

Assumptions include: (a) that a particular cause (X) must precede an assumed effect (Y), (b) that variables that are specified, X and Y, must be associated, (c) that additional confounding variables that could potentially explain the effect that X has on Y have been maximally controlled for, (d) that the analysis methods that are used are appropriate given the manner in which variables are distributed, and (e) that the direction of the specified causal path (e.g., X predicts Y) is correct as opposed to a reverse (e.g., Y predicts X) or reciprocal (X predicts Y, Y predicts X) effect (Kline, 2016). These assumptions were addressed in a number of ways within this study. In particular, assumption (a) and (e) which relate to the presumed direction and causality of specified effects were, in part, addressed by the presence of temporal precedence within the study design. That is, rather than all data being collected in a cross-sectional manner, which is a common limitation within SEM studies (Kline, 2016), the key variables within the

current study were collected at differing time points. These included previous standardized test scores being collected in sixth grade for seventh and eighth grade students, eighth grade for ninth grade students, and ninth grade for tenth and eleventh grade students. Additionally, MSCS-SV data was collected in the fall and BNSG-S and AMS data were collected in the spring for all students. This design element helps to increase confidence in the assertion that the presumed cause is occurring before the presumed effect. Although BNSG-S and AMS data were collected in a cross-sectional manner which serves as a weakness to this study, as previously noted, both theoretical underpinnings and a previously discussed literature base serve to qualify the directions of these pathways, namely the impacts of basic psychological needs on academic motivation orientations.

Assumption (b), concerning the presence of associations between X and Y, and assumption (d) regarding the form of the distribution of the data matching analysis techniques, were addressed through steps within the analysis procedure. Specifically, the mean, skewness, and kurtosis values for all factor items and outcome data were assessed for normality prior to analysis. In addition to these steps, the correlation matrixes reflecting associations between all latent variables were examined for all grades (see Appendix E through J). All non-significant associations between variables were removed from the model in a stepwise fashion via a path analysis procedure discussed below. Finally, assumption (c) involving the control of confounding variables, was addressed through the inclusion of a large number of latent factors (e.g., multiple school climate/academic motivation factors) as well as the previous standardized test score variable within the model which was intended to help partially control from student innate academic ability as a confounding variable.

Analysis. The following analysis process consisted of a series of preliminary steps including assessment of descriptive statistics for survey and outcome variables, comparison of means between middle and high school samples, and examination of the factor structures of the MSCS-SV, BNSG-S, and AMS scales via a CFA process. Following these steps, a path analysis process involving the examination of measurement, just-identified, conceptual, and trimmed/finalized models was conducted for each grade level to assess relationships amongst factors and academic outcome variables. Specifically, GPA (for all middle and high school grades) and current standardized test scores were predicted from all model variables including previous standardized test scores. In addition to allowing for the assessment of research question two, which was primarily concerned with comparing and contrasting factor relationships across grade levels to assess for the consistency of results, specification of separate models for each grade levels was most appropriate given that the availability and type of standardized test score data differed by grade (e.g., SBAC 6^{th} through 8^{th}, PSAT 9^{th} and 10^{th}, SAT in 11^{th}). As such, because analysis of data solely at the middle and high school level would limit conclusions that could be drawn regarding specific grades and would threaten the validity of results due to summation of differing sources of outcome data across grades, the decision was made to analyze data at the grade level. Furthermore, the large by grade sample size (See Table 1) made analysis in this manner possible.

Model specification was guided by research-informed hypothesized models which reflect results from previously discussed studies. Three hypothesized models are presented in Figures 1-2. Following the path analysis process, a total of six trimmed/finalized models representing one for each grade was specified. Fit statistics used to assess model fit included the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual

(SRMR), the Comparative Fit Index (CFI) and the Tucker-Lewis/Non-normed Fit Index (TLI; Hu & Bentler, 1999; Kline, 2016). Following specification of each model by grade level, comparison of trends within and across the middle and high school levels was also conducted.

CHAPTER III

Results

Descriptive Statistics

All student responses on survey items had skewness values below an absolute value of three and kurtosis values below an absolute value of ten, suggesting that these items meet thresholds to be considered as normally distributed (Kline, 2016). Outcome data reflecting GPA and standardized tests scores across all grades were also found to be normally distributed. Standardized test scores for students in sixth through eighth grades (SBAC) included both an English Language Arts/Literacy score and a Mathematics score, whereas standardized test scores for students in ninth through eleventh grades (PSAT/SAT) reflected Evidence-Based Reading and Writing (EBRW) and Math score components. For the middle school grades (SBAC scores), a z-score for the English Language Arts/Literacy and Mathematics scores was calculated and then the average of this score was used as an observed current standardized test score outcome variable. For the high school grades (PSAT/SAT scores) a higher-order latent construct reflecting current standardized test scores was created from the EBRW and Math score components. For each of the grade levels respectively, the same process was utilized to create the previous standardized test score variables.

Comparison of means. Means were calculated for each of the primary survey factors by individual grade and by school level (See Table 2). Overall trends across the variables indicate that average levels of teacher support, teacher fairness, peer support, and respect for differences are lower in high school than in middle school while perceived school bullying was found to be at a higher level at the high school level. Overall, academic competence was found to be higher in middle school whereas relatedness was found to be at approximately an equivalent level

across both middle and high school. As has been in the case in previous research, mean levels of intrinsic motivation and extrinsic motivation were found to lower at the high school level while amotivation was found to be higher (Lepper, et al., 2005; Otis et al., 2005).

A series of independent samples t-test analysis were conducted to further evaluate differences across these factors by school level (e.g., middle vs. high; See Table 3). Results suggest that there are significant differences in means for a number of factors including all school climate factors with the exception of peers support, for academic competence but not for relatedness, and for intrinsic, extrinsic, and amotivation. These results suggest that overall student perceived levels of particular school climate and academic motivation factors may differ across the middle and high school grades.

Confirmatory Factor Analysis and Reliabilities

Following data cleaning procedures and descriptive analyses, the data set was split by middle and high school, and a confirmatory factor analysis was conducted for each of the measures at the middle and high school levels.

Meriden school climate – student version. Items reflecting the parent values and home environment factors were dropped from analysis given that the purpose of this study was focused on school-level factors. As such, the initial CFA process involved fitting 31 items across four factors which included *Teacher Support* (13 items), *Perceived School Bullying/School Safety* (7 items), *Respect for Differences* (7 items), and *Friends Support* (4 items). This original, pre-CFA process version of the MSCS-SV process can be further examined in Appendix B. The model specification process with fit statistics is displayed in Table 4. The initial 31 item, four factor model indicated a poor model fit (RMSEA >.08, CFI/TFI <.95, SRMR >.08) for both the middle school and high school models. As such, a re-specification process was conducted resulting in a

number of factor and item changes. Specifics as to why factors and items that were removed from the scale during this process can be found in Appendix E.

The final post-CFA 18 item, five factor MSCS-SV is presented in Appendix G. Factors include *Teacher Care* (5 items), *Teacher Fairness* (3 items), *Perceived School Bullying* (3 items*), Respect for Differences* (4 items), and *Peer Support* (3 items). Fit statistics (See Table 4) suggest adequate measurement model fit (RMSEA ≤.08, CFI/TLI≥95, SRMR≤.08) across both the middle and high school models. Additionally, Cronbach's alpha reliability estimates were calculated for each factor based on combined middle and high school data. All reliability estimates ranged between α=.74 and α=.83, falling in the "Adequate" to "Very good" range (Kline, 2016) and were as follows: *Teacher Support* α = .80, *Teacher Fairness* α =.83, *Perceived School Bullying* α = .77, *Respect for Differences* α = .74, and *Peer Support* α = .82.

Basic psychological needs scale. The original basic psychological needs scale consisting of nine items across the three factors of *Academic Autonomy*, *Academic Competence*, and *Relatedness* was evaluated within the middle and high school samples. This pre-CFA version can be further examined in Appendix C. Results from this model and the re-specification processes are presented in Table 6. A number of factor and item edits were made based on CFA results and the for the purposes of the present study. This process is discussed in more depth in Appendix F.

Following the modifications discussed in Appendix F, a seven item, two-factor model representing student perceptions of academic competence and relatedness was specified. This version of the BPNS is presented in Appendix H. Results (see Table 6) indicated adequate model fit for both the middle and high school models. Cronbach's alpha reliability estimates for the *Academic Competence* (α = .83) and *Relatedness* (α = .84) factors both fell within the "Very Good" range (Kline, 2016).

Academic motivation scale. The *AM*S consisting of 12 items across the three factors of *Instrinsic Motivation, External Motivation,* and *Amotivation* was evaluated for factor consistency within the middle and high school samples. This pre-CFA version can be further examined in Appendix D. Results from this CFA and the re-specification process are presented in Table 8. Given that fit statistics reflecting the three factor model suggested acceptable model fit for both the middle and high school models (RMSEA≤.08, CFI/TLI ≥.95, SRMR≤.08), all factors and items were retained and only a minor specification was made to the original model. That is, the errors of items g82 *(I go to school because if I left school, I would not find a job that pays enough*) and g85 *(I go to school to have a better salary later*), which were representative of the same construct (Extrinsic Motivation), were found to be theoretically similar (e.g., motivation to work now to increase the potential to earn more financially) and were correlated to a high degree relative to other within factor items (middle school r = 0.52, high school r=0.52). In balancing these factors with a primary goal of including numerous items per factor as to better estimate construct reliability, the decision was made to correlate the error terms of these factors.

The final 12 item, three factor *AM* scale is presented in Appendix I. Cronbach's alpha reliability estimates for the *Intrinsic Motivation* (α = .91), *Extrinsic Motivation* (α = .85), and *Amotivation* (α = .84) factors all fell within the "Very Good" range (Kline, 2016). The correlations for latent factors for the finalized CFA models are presented separately by middle and high school in Tables 10 and 11 respectively. Correlations between all latent factors by grade level are provided for reference in Appendixes J through L.

Path Analysis Results

For each of the six grades (sixth through eleventh), a path analysis process was conducted in order to facilitate model development. This included examination of the measurement, just-

identified, conceptual, and finalized/trimmed models. Within this process, the just-identified model involved specification of pathways between all factors, including previous standardized test scores for grades seven through eleven, as to ensure that models were estimated with zero degrees of freedom. Specification of the conceptual model was guided by the theoretical model illustrated in Figure 1 and results were examined in reference to the most research supported pathways illustrated in Figure 2. During conceptual model specification, pathways that emerged as significant within the just-identified model were retained. Finally, trimmed models which included only significant pathways were estimated as to establish the finalized models.

Analysis was conducted by grade level, rather than solely by school level, in order to further understanding of grade specific trends (research question two) and due to the fact that the availability and type of standardized test scores differed depending on the grade (e.g., 9^{th} and 10^{th} grade PSAT, 11^{th} grade SAT). Fit indices including the chi-square, RMSEA, CFI/TLI, and SRMR values were used to assess model fit based on standards outlined by Hu and Bentler (1999) as follows: of RMSEA $\leq$.08, SRMR$\leq$.06, and CFI/TLI $\geq$. 95. It was expected that all Chi-square values would be significant given known chi-square test limitations related to the testing of large sample sizes (Meade, Johnson & Braddy, 2008). An overall summary of pathway results across all grades is provided with school level (middle and high) and grade specific results following. In general it is important to note that all pathways displayed and discussed are reflective of the direct effects of the given predictor variable on the outcome (endogenous) variable after controlling for the influence of all other factors used to predict that same outcome variable (e.g., A is predictive of D after controlling for factors B and C which are also modeled to predict D).

Summary of results across grades. Table 12 presents pathways and associated directions for standardized regression coefficients which were significant (p-value ≤.05) across four or more middle and high school grade levels and Figure 3 displays these results within a path model. Consistency in effects across grade levels provides evidence for the validity of these associations. Regarding school climate factors, student perceptions of teacher support and school bullying were found to be the most consistent predictors of student basic psychological needs across grades, with perceptions of peer support and respect for differences emerging as less predictive of model variables. Specifically, student perceptions of teachers as supportive positively predicted perceptions of academic competence in five out of the six assessed grades and perceptions of relatedness in four out of six grades when controlling for all other model variables used to predict these outcomes. Perceived school bullying was found to negatively predict relatedness for five out of six grades, and to negatively predict student intrinsic motivation for four out of six grades when controlling for additional model predictors.

Regarding motivation factors within the model, academic competence was found to be the most consistent motivation-based predictor of student academic motivation orientations and student GPA. Specifically, academic competence was found to be a positive predictor of intrinsic motivation and extrinsic motivation and a negative predictor of amotivation across all grades. Academic competence was found to directly and positively predict student GPA across all grades after controlling for all other model predictors including previous standardized test scores. Additionally, amotivation was found to negatively predict GPA in four out of six grades. With the exception of the sixth grade model which did not include a previous standardized test score factor, previous standardized test scores were found to positively predict academic competence across all grades. In general, previous standardized test scores were found to be the strongest,

direct positive predictor of current standardized test scores across all grades (average β across grades = .86).

Middle school model summary. Table 13 presents pathways and association directions for standardized regression coefficients which were significant (p-value ≤.05) for two or more middle school grades. Furthermore, Figure 4 displays a summarized middle school path model with these effects. As discussed in the overall model summary, the role of teacher support was found to consistently predict student academic competence in all three middle school grades and to positively predict student perceptions of relatedness in two out of three grades (7^{th} and 8^{th}), after controlling for all other factors used to predict these variables. Additionally, perceived school bullying was found to negatively predict relatedness for all three middle school grades and to negatively predict intrinsic motivation for two out of three grades (6^{th} and 8^{th}). The role of perceptions of peer support as positively predicting student perceptions of relatedness in two grades (6^{th} and 7^{th}) was observed as a unique effect present within the middle school models relative to the high school models. Furthermore, academic competence was found to directly, positively predict intrinsic motivation, extrinsic motivation, and GPA in all three grades and to negatively predict GPA. Overall previous standardized test scores emerged as the most robust direct, positive predictor of current standardized test scores.

High school model summary. Table 14 presents pathways and association directions for standardized regression coefficients which were significant (p-value ≤.05) for two or more high school grades. Furthermore, Figure 5 displays a summarized high school path model illustrating these effects. After controlling for other model predictors, perceived teacher support was found to predict academic competence and relatedness for the ninth and tenth grades while perceived school bullying was observed as a predictor of relatedness in the tenth and eleventh grades.

Additionally, academic competence emerged as positively predictive of intrinsic motivation and extrinsic motivation, and as a negative predictor of amotivation. A unique effect observed within the high school model across all three grades was a negative relationship between amotivation and GPA. Previous standardized test scores were found to play a more substantial role within the high school model relative to the middle school model. Specifically, for all three high school grades, previous standardized test scores were found to positively predict peer support and for two out of three grades, previous standardized test scores were found to negatively predict both intrinsic motivation and amotivation. As observed in the middle school model, previous standardized test scores were found to strongly, positively predict current standardized test scores. Grade specific model results are presented below and latent factor correlations by grade are presented in Appendix E through J.

Middle school grade-specific model results. Given that previous standardized test scores were not available for students in grade six; this factor could not be used as a covariate within the sixth grade model. Additionally, when including both previous standardized test scores and current standardized test scores within the models for the 7th and 8th grades a number of errors related to model fit resulted. Despite attempts to fix these errors via a z-score transformation and subsequent process which included constraining factor loadings to one and fixing error terms according to reliability estimates (variance x (1-estimated reliability), the issue persisted. As such, the decision was made to specify previous and current SBAC as observed variables, derived from the average of SBAC domain areas, within the 7th and 8th grade models.

Sixth grade. The sixth grade model assessed relationships amongst school climate, basic psychological needs, and academic motivation factors with the primary outcomes of GPA and standardized test scores. Fit indices from the measurement, conceptual, and trimmed/finalized

model are presented in Table 15. Model fit indices across all models suggested poor model fit for the chi-square value ($p \leq 0.00$), which was expected given the large sample size, adequate fit for RMSEA and SRMR indices and near adequate fit for CFI and TLI indices based upon suggested standards by Hu and Bentler (1999). This pattern of results is not uncommon given differing methods used to calculate the fit indices and the large number of variables utilized within the models. Specifically, the RMSEA and SRMR fit indices take into consideration sample size and tend to improve as sample size and number of model variables increase, while the CFI and TLI do not take into consideration sample size and tend to worsen as the number of variables in the model increases (Kenny & McCoach, 2003).

The finalized fit indices for the trimmed/finalized model (See Table 15) included a chi-square ($\chi 2$) value of 1166.050 with 704 degrees of freedom ($p = 0.00$), a RMSEA value of .039 (90% confidence interval = 0.035 – 0.043), a CFI value of .938, a TLI value of .931, and an SRMR value of .059. These results suggested "Good" model fit for the RMSEA and SRMR indices and near "Acceptable" fit for CFI/TLI values. As such, the model was, in general, considered to adequately represent the sixth grade student data.

Standardized regression coefficients. Table 16 displays the standardized regression coefficients that emerged as significant at the $p \leq .05$ level within the sixth grade model. It is important to note that all within construct factors (e.g., teacher support, teacher fairness, etc. within the school climate construct) were correlated within the model. Pathways are separated between those that were hypothesized in the conceptual model (Figure 1) and those that emerged as additional significant pathways. Furthermore, Figure 6 represents the finalized sixth grade path model.

Regarding school climate factors, student perceptions of teacher support, teacher fairness, school bullying, and peer support were found to predict various model factors (See Table 16). In particular, teacher support emerged as a strong positive predictor of student reported academic competence (β=0.44). Teacher support also positively predicted intrinsic motivation (β=0.22) and negatively standardized test scores (β=-0.29). Perceptions of school bullying negatively predicted relatedness (β=-0.14) and positively predicted intrinsic motivation (β=0.23), while peer support positively predicted relatedness (β=0.30). Regarding BPN factors, academic competence was found to play an essential role in positively predicting intrinsic motivation (β=0.28), extrinsic motivation (β=0.64), standardized test scores (β=0.43) and GPA (β=0.75) and negatively predicting Amotivation (β=0.45). Finally, both intrinsic motivation and amotivation were found to negatively predict standardized test scores (β=-0.54, β=-0.23) and GPA (β=-0.37, β=-0.19), while extrinsic motivation was found to positively predict standardized test scores (β=0.21

*Proportion of variance explained***.** The proportion of variance in latent and observed endogenous variables that was captured by relevant model predictors is presented in Table 17. Results suggest that 19.7% of the variance in academic competence was explained by the sole predictor, teacher support, while 14.2% of the variance in relatedness was explained by perceived school bullying and peer support. Additionally, a significant proportion of the variance in intrinsic motivation (46.0%), extrinsic motivation (41.2%), and amotivation (19.9%) were captured directly by the predictors of academic competence and/or relatedness or both directly and indirectly by previously discussed school climate factors. Finally, direct and indirect model predictors were found to capture a significant proportion of variance in both standardized test scores (31.1%) and GPA (35.6%)

Seventh grade. The seventh grade model assessed relationships amongst previous standardized test scores (sixth grade SBAC scores as an observed variable), school climate, basic psychological needs, and academic motivation factors with the primary outcomes of GPA and current standardized test scores. Fit indices from the measurement, conceptual, and trimmed/finalized model are presented in Table 18. Similar to the sixth grade model, fit indices across all models suggested poor model fit for the Chi-square value ($p \leq 0.00$) , which was expected given the large sample size, adequate fit for RMSEA and SRMR indices and near adequate fit for CFI and TLI indices (Hu and Bentler, 1999). The finalized fit indices for the trimmed/finalized model (See Table 18) included a chi-square ($\chi 2$) value of 1227.148 with 692 degrees of freedom ($p \leq 0.00$), a RMSEA value of .047 (90% confidence interval = 0.043 – 0.052), a CFI value of .929, a TLI value of .920, and an SRMR value of .063. Based on these results, suggesting good model fit for the RMSEA and SRMR indices and near acceptable fit for CFI/TLI values, the model was, in general, considered to adequately represent the data.

Standardized regression coefficients. Table 19 displays the standardized regression coefficients that emerged as significant at the $p \leq .05$ level within the seventh grade model. It is important to note that all within construct factors were correlated within the model with the exception of the school climate perceived school bullying and peer support factors for which the correlation was non-significant. Pathways are separated between those that were hypothesized in the conceptual model (Figures 1-2), and those that emerged as additional significant pathways beyond conceptual pathways. Figure 7 represents the finalized seventh grade path model.

Overall, previous standardized test scores emerged as the sole direct predictor of student current standardized test scores ($\beta = 0.89$) and also emerged as a positive predictor of GPA ($\beta = 0.63$). Previous standardized test scores were found to positively predict a number of school

climate factors including student perceptions of teachers fairness (β=0.92), peer support (β=0.13), and academic competence (β=0.21) and to negatively predict perceptions of school bullying (β= -0.14) and intrinsic motivation (β=-0.22). After controlling for previous standardized test scores, a number of model effects remained significant in predicting motivation orientations and outcomes. Regarding school climate factors, perceived teacher support was found to positively predict both academic competence (β=0.62) and relatedness (β=0.46) while peer support positively predicted solely relatedness (β=0.21). Teacher support was also found to positively predict intrinsic motivation (β=0.23) and peer support was found to negatively predict intrinsic motivation (β= -0.13). Perceived school bullying was found to negatively predict relatedness (β= -0.24). Additionally, Similar to the 6th grade model, academic competence was found to play a strong role in positively predicting intrinsic motivation (β=0.71), extrinsic motivation (β=0.72), and GPA (β=0.32) and to negatively predict amotivation (β= - 0.64).

Proportion of variance explained. The proportion of variance in latent and observed endogenous variables that was captured by relevant model predictors is presented in Table 20. Significant portions of both academic competence (43.1%) and relatedness (51.3%) were explained by model predictors including, previous standardized test scores and the school climate factors of student perceived teacher support, school bullying, respect for differences, and peer support (relatedness only). Additionally, a significant proportion of the variance in intrinsic motivation (66.2%), extrinsic motivation (51.1%), and amotivation (41.2%) were captured directly by the predictors of academic competence and/or relatedness or both directly and indirectly by various climate factors and/or previous standardized test scores. Finally, direct and indirect model predictors were found to capture a significant proportion of variance in GPA

(59.2%) and current standardized test scores (78.7%) with previous standardized test scores having the largest direct effect.

Eighth grade. The eighth grade model mirrored the seventh grade model in assessing standardized test scores (sixth grade SBAC scores as an observed variable), school climate, basic psychological needs, and academic motivation factors with the primary outcomes of GPA and current standardized test scores. Fit indices from the measurement, conceptual, and trimmed/finalized model are presented in Table 21. Fit indices across all models suggested poor model fit for the Chi-square value ($p \leq 0.00$), adequate fit for RMSEA and SRMR indices and near adequate fit for CFI and TLI indices. The finalized fit indices for the trimmed/finalized model included a chi-square ($\chi 2$) value of 1027.879 with 704 degrees of freedom ($p \leq 0.00$), a RMSEA value of .039 (90% confidence interval = 0.034 – 0.044), a CFI value of .945, a TLI value of .939, and an SRMR value of .061. Based on these results, suggesting good model fit for the RMSEA and SRMR indices and near acceptable fit for CFI/TLI values, the model was, in general, considered to adequately represent the data.

Standardized regression coefficients. Table 22 displays the standardized regression coefficients that emerged as significant at the $p \leq .05$ level within the eighth grade model. All within construct factors were correlated with the exception of perceived school bullying with peer support, respect for differences with peer support, and intrinsic motivation with extrinsic motivation, due to non-significance Pathways are separated between those that were hypothesized in the conceptual model (Figures 1-2), and those that emerged as additional significant pathways beyond conceptual pathways. Figure 8 represents the finalized eighth grade path model.

Previous standardized test scores were found to be the strongest direct predictor of current standardized test scores (β = 0.83) and also positively predicted GPA (β = 0.51). Previous standardized test scores also positively predicted academic competence (β=0.15) and negatively predicted both perceived school bullying (β= -0.26) and intrinsic motivation (β= -0.20). Similar to the seventh grade model, teacher support positively predicted academic competence (β=0.51) and relatedness (β=0.44) while school bullying negatively predicted academic competence (β= -0.15) and relatedness (β= -0.20). Perceived school bullying was also found to positively predict both intrinsic (β=0.16) and extrinsic motivation (β=0.32). As was the case in the other middle school grades, academic competence was found to be a strong positive predictor of intrinsic motivation (β=0.74), extrinsic motivation (β=0.99), GPA (β=0.76), and current standardized test scores (β=0.28) and a strong negative predictor of amotivation (β=0.49). It was noted that, academic competence was found to be a stronger predictor of current GPA than previous standardized test score (β = 0.76 vs. β = 0.51). Relatedness negatively predicted extrinsic motivation (β= - 0.34), GPA (β= -0.35) and current standardized test scores (β= - 0.24). Similar to the 7th grade model, no significant associations between academic motivation orientations and GPA or current standardized test scores were observed.

Proportion of variance explained. The proportion of variance in latent and observed endogenous variables that was captured by relevant model predictors is presented in Table 23. A significant proportion of the variance in perceived school bullying (6.9%) was predicted by previous standardized test scores. A significant portion of both academic competence (34.1%) and relatedness (25.6%) were explained by model predictors including, previous standardized test scores (academic competence only) and student perceived teacher support and perceived school bullying. Similar to both the sixth and seventh grade models, a significant proportion of

the variance in intrinsic motivation (50.8 %), extrinsic motivation (54.2%), and amotivation (24.3%) were captured directly by the predictors of academic competence and/or relatedness or both directly and indirectly by various climate factors and/or previous standardized test scores. Finally, direct and indirect model predictors were found to capture a significant proportion of variance in GPA (56.6%) and current standardized test scores (78.0%).

High school grade specific models. All high school models (ninth through eleventh) were estimated using previous standardized test scores (latent factor), MSCS-SV factors, BPN factors, and AM factors as predictors and GPA and current standardized test scores (latent factor) as outcome variables. Model results are summarized below.

Ninth grade. Fit indices from the measurement, conceptual, and trimmed/finalized models for the ninth grade are presented in Table 24. Fit indices across all 9^{th} grade models suggested poor model fit for the Chi-square value ($p \leq 0.00$) , which was expected given the large sample size, adequate fit for RMSEA and SRMR indices and near adequate fit for CFI and TLI indices. The finalized fit indices for the trimmed/finalized model included a chi-square ($\chi 2$) value of 1298.047 with 781 degrees of freedom ($p \leq 0.00$), a RMSEA value of .039 (90% confidence interval = 0.035 – 0.042), a CFI value of .944, a TLI value of .938, and an SRMR value of .052. Based on these results, suggesting good model fit for the RMSEA and SRMR indices and near acceptable fit for CFI/TLI values, the model was, in general, considered to adequately represent the variance/covariance matrix.

Standardized regression coefficients. Table 25 displays the standardized regression coefficients that emerged as significant at the $p \leq .05$ level within the ninth grade model. All within construct factors were correlated with the exception of intrinsic motivation with extrinsic motivation due to non-significance. Pathways are separated between those that were

hypothesized in the conceptual model (Figures 1-2), and those that emerged as additional significant pathways beyond conceptual pathways. Figure 9 displays the finalized ninth grade path model.

Previous standardized test scores emerged as the strongest direct predictor of current standardized test scores (β=0.82) and as a positive predictor of GPA (β=0.28). Previous standardized test scores were also found to positively predict peer support (β=0.19) and academic competence (β=0.14) and to negatively predict intrinsic motivation (β= -0.17). Teacher support positively predicted academic competence (β=0.44), relatedness (β=0.48), and intrinsic motivation (β=0.19). Additionally, perceived school bullying was found to positively predict intrinsic motivation (β=0.12) while peer support negatively predicted amotivation (β= -0.15). Academic competence was found to be a strong positive predictor of intrinsic motivation (β=0.68), extrinsic motivation (β=0.74), and GPA (β=0.65) and a negative predictor of amotivation (β= -0.36). Relatedness emerged as a negative predictor of GPA (β= -0.25). Both intrinsic motivation and amotivation were negatively associated with GPA (β= -0.21, β= -0.15) and extrinsic motivation was positively associated with current standardized test scores (β=0.14).

Proportion of variance explained. The proportion of variance in latent and observed endogenous variables that was captured by relevant model predictors is presented in Table 26. A significant portion of both academic competence (21.6%) and relatedness (22.7%) were explained by model predictors including, previous standardized test scores (academic competence only) and teacher support. A significant proportion of the variance in intrinsic motivation (57.5 %), extrinsic motivation (55.0%), and amotivation (18.1%) were captured directly by the relevant predictors of academic competence and/or relatedness or both directly and indirectly by various climate factors and/or previous standardized test scores. Finally, direct

and indirect model predictors were found to capture a significant proportion of variance in GPA (33.0%) and current standardized test scores (71.2%).

Tenth grade. Fit indices from the measurement, conceptual, and trimmed/finalized models for the tenth grade are presented in Table 27. Fit indices across all models suggested poor model fit for the Chi-square value ($p \leq 0.00$), which was expected given the large sample size, adequate fit for RMSEA and SRMR indices and near adequate fit for CFI and TLI indices. The finalized fit indices for the trimmed/finalized model included a chi-square ($\chi 2$) value of 1476.782 with 7782 degrees of freedom ($p \leq 0.00$), a RMSEA value of .046 (90% confidence interval = 0.043 – 0.050), a CFI value of .927, a TLI value of .919, and an SRMR value of .070. Based on these results, suggesting good model fit for the RMSEA and SRMR indices and near acceptable fit for CFI/TLI values, the model was, in general, considered to adequately represent the variance/covariance matrix.

Standardized regression coefficients. Table 28 displays the standardized regression coefficients that emerged as significant at the $p \leq .05$ level within the tenth grade model. All within construct factors are correlated with the exception of intrinsic motivation with extrinsic motivation and amotivation, and extrinsic motivation with amotivation, due to non-significance Pathways are separated between those that were hypothesized in the conceptual model (Figures 1-2), and those that emerged as additional significant pathways beyond conceptual pathways. Figure 10 displays the finalized tenth grade path model.

Previous standardized test scores were found to be the strongest direct positive predictor of both current standardized test scores ($\beta=0.99$) and GPA ($\beta = 0.63$). Previous standardized test scores also predicted teacher support ($\beta = 0.15$) and peer support ($\beta=0.16$), and negatively predicted intrinsic motivation ($\beta= -0.12$) and amotivation ($\beta= -0.19$). Teacher support positively

predicted academic competence (β=0.36) and relatedness (β=0.44). Academic competence was found to positively predict intrinsic motivation (β=0.77), extrinsic motivation (β=0.71), and GPA (β=0.49) and to negatively predict amotivation (β= -0.34). Relatedness emerged as a negative predictor of GPA (β= -0.21). Intrinsic motivation was positively associated with current standardized test scores (β=0.13) and amotivation was negatively associated with GPA (β= -0.15).

Proportion of variance explained. The proportion of variance in latent and observed endogenous variables that was captured by relevant model predictors is presented in Table 29. Significant portions of both academic competence (12.8%) and relatedness (18.9%) were explained by model predictors including, previous standardized test scores (academic competence only), and student perceptions of teacher support and school bullying. A significant proportion of the variance in intrinsic motivation (59.5 %), extrinsic motivation (50.6%), and amotivation (15.7%) were captured directly by the predictor of academic competence and/or directly and/or indirectly by previous standardized test scores. Finally, direct and indirect model predictors were found to capture a significant proportion of the variance in GPA (61.5%) and current standardized test score (98.9%), nearly all of which was accounted for by the influence of previous standardized test score.

Eleventh grade. Fit indices from the measurement, conceptual, and trimmed/finalized models for the eleventh grade are presented in Table 30. Fit indices across all models suggested poor model fit for the Chi-square value ($p \leq 0.00$), adequate fit for RMSEA and SRMR indices and near adequate fit for CFI and TLI indices. The finalized fit indices for the trimmed/finalized model included a chi-square ($\chi 2$) value of 1508.081 with 782 degrees of freedom ($p \leq 0.00$), a RMSEA value of .048 (90% confidence interval = 0.045 – 0.052), a CFI value of .929, a TLI

value of .922, and an SRMR value of .049. Based on these results, suggesting good model fit for the RMSEA and SRMR indices and near acceptable fit for CFI/TLI values, the model was, in general, considered to adequately represent the variance/covariance matrix.

Standardized regression coefficients. Table 31 displays the standardized regression coefficients that emerged as significant at the $p \leq .05$ level within the eleventh grade model. All within construct factors are correlated with the exception of teacher support with school bullying, teacher fairness with school bullying, school bullying with peer support, respect for differences with peer support, intrinsic motivation with extrinsic motivation, and intrinsic motivation with amotivation, all of which were found to be correlated at a non-significant level. Pathways are separated between those that were hypothesized in the conceptual model (Figures 1-2), and those that emerged as additional significant pathways beyond conceptual pathways. Figure 11 represents the finalized eleventh grade path model.

Previous standardized test scores were found to be the strongest direct predictors of both current standardized test scores ($\beta = 0.78$) and GPA ($\beta = 0.43$). Previous standardized test scores were also found to positively predict teacher support ($\beta=0.14$), peer support ($\beta=0.24$), and academic competence ($\beta=0.13$) and to negatively predict amotivation ($\beta= -0.14$). Teacher fairness was found to positively predict academic competence ($\beta=0.33$) and relatedness ($\beta=0.34$) while perceived school bullying was found to negatively predict these two factors ($\beta= -0.30$, $\beta= -0.32$). Teacher support was negatively associated with amotivation ($\beta= -0.22$) and peer support was positively associated with relatedness ($\beta=0.14$). Academic competence was found to be a strong positive predictor of intrinsic motivation ($\beta=0.42$), extrinsic motivation ($\beta=0.81$), and GPA ($\beta=0.37$) and a negative predictor of amotivation ($\beta= -0.26$). Relatedness emerged as a positive predictor of intrinsic motivation ($\beta=0.40$). Additionally, extrinsic motivation negatively

predicted GPA (β= -0.21) while amotivation negatively predicted both GPA (β= -0.22) and current standardized test scores (β= -0.15).

Proportion of variance explained. The proportion of variance in latent and observed endogenous variables that was captured by relevant model predictors is presented in Table 32. A significant portion of both academic competence (23.8%) and relatedness (27.3%) were explained by model predictors including, previous standardized test scores (academic competence only) and perceptions of teacher fairness, school bullying, and peer support (relatedness only). A significant proportion of the variance in intrinsic motivation (61.1 %), extrinsic motivation (65.9%), and amotivation (19.1%) were captured directly by the predictors of academic competence and/or relatedness and/or directly/indirectly by various school climate factors and previous standardized test scores. Finally, direct and indirect model predictors were found to capture a significant proportion of variance in both GPA (38.1%) and current standardized test scores (68.1%) with previous standardized test scores accounting for the largest influence in these variables.

Assessment of mediation. Following assessment of shared effects, a number of indirect pathways between variables were tested for the extent to which particular variables within these pathways mediate relationships (See Table 33). Specifically, mediation was conducted through use of a bootstrap procedure and subsequent examination of effect sizes and confidence intervals. Pathways examined for mediation included (a) competence as mediating the relationship between previous standardized test scores and intrinsic motivation (seventh, eighth), (b) competence as mediating the relationship between perceived school bullying and intrinsic motivation (eighth), and (c) amotivation as mediating the relationship between competence and high school GPA (ninth, tenth, and eleventh). Results from these analyses, including effect sizes

and confidence intervals for each of the direct and indirect effects by grade are reported in Table 33.

Examination of the estimates and confidence intervals for the direct and indirect pathways between previous standardized test scores and intrinsic motivation reveals that there were no zero values within the 95% confidence intervals for seventh and eighth grade. This suggests that suggests that competence partially mediates the relationship between these variables. The direct pathway between previous standard test scores and intrinsic motivation was found to be significant in the tenth grade model, whereas the indirect pathway contained the value of zero and thus was found to be significant. This suggests that competence does not significantly mediate the relationship between these variables. Regarding school bullying and intrinsic motivation in eighth grade, the direct pathway between these variables was found to be significant (95% CI contained zero) as was the indirect pathway as mediated by competence. This suggests that the relationship between perceived school bullying and intrinsic motivation is partially mediated by competence for the eighth grade. Finally, the extent to which amotivation serves as a mediator to the relationship between competence and high school GPA was evaluated. Results across all models indicated that both the direct and indirect pathways between these relationships were significant given that zero was not contained within any of the 95% confidence intervals. These results suggest that amotivation partially mediates the relationship between competence and GPA for the ninth, tenth, and eleventh grades. Within this relationship, across grades it was noted that the effect of the indirect pathways were much weaker than the effects of the direct pathways representing the relationship between competence and high school GPA.

Chapter IV

Discussion

Of the few research studies that have explicitly linked the school climate and academic motivation domains (Eccles et al.,1993; Joe et al., 2017; Marchant et al., 2001), a majority have been subject to various limitations including examination of few school climate and/or self-determination-based motivation factors, a narrow focus on student functioning within specific classroom contexts or with specific teachers, and/or concentration on students within specific grades. The present study sought to address these gaps by furthering understanding of how school-climate factors relate to self-determination theory-based constructs of student motivation and, ultimately, student academic achievement utilizing a large sample of middle and high school students. The first research question assessed the direct and indirect relationships between school climate, academic motivation factors, and student academic outcomes while controlling for other model predictors including previous standardized test scores. The second research question examined the extent to which results were replicated across grades.

After controlling for the influence of previous standardized test scores, the current results suggest that there are a number of predictive relationships between the school climate factors of student perceived teacher support and school bullying, the basic psychological needs factors of academic motivation and relatedness, and the academic motivation factors of intrinsic, extrinsic, and amotivation. Furthermore, results suggest that these school climate and academic motivation factors ultimately directly and/or indirectly predict student GPA and that specific result patterns are consistent across the middle and high school levels. Influential factors within each of the primary construct areas are discussed below.

School Climate Factors

Overall, student perceptions of teacher support, school bullying, and peer support were found to be the most salient school climate factors in predicting student basic psychological needs across the middle and high school models, whereas the school climate factors of perceived teacher fairness and respect for differences were found to play a less substantial role. With the exception of respect for differences, these results are consistent with the hypothesized model displayed in Figure 2 which indicates that student perceptions of teacher support and peer support are currently the most research supported school climate factors in predicting student outcomes.

After controlling for all other predictors, perceptions of teacher support were found to positively predict academic competence for all but one grade (eleventh) and to predict relatedness in four out of six grades. These results are consistent with previous research by Guay and Vallerand (1997) and Marchant and colleagues (2001) which found student perceptions of teacher responsiveness (e.g., teacher interest in and support of students) and autonomy support to positively predict student perceptions of school competence among high school and elementary students. The current results expand upon previous findings in that this effect was observed within a sample of middle school students. After controlling for the influence of all school climate factors and previous standardized test scores, these results suggest that student perceptions of supportive relationships with teachers positively predict self-beliefs regarding the successful completion of school-based tasks. Results also indicated that perceptions of teacher support positively predicted student perceptions of relatedness at both the middle and high school level. These results are consistent with findings by Connell et al. (1995) and Cox and Williams (2008), who reported that when elementary and school students feel supported teachers

in school, they are more likely to report higher levels of perceived relatedness with others. The present study expands upon these findings by observing this effect at the high school level.

Across all grades and after controlling for all other model predictors, students who perceived higher rates of bullying also endorsed lower rates of school relatedness, disagreeing more with statements about "fitting in" and "getting along with others". As previously discussed, there has been limited research explicitly examining the relationship between school bullying and the student basic psychological needs construct of relatedness. This pattern of results helps to fill this gap in the literature and makes theoretical sense in suggesting that perceptions of being bullied may be influential in shaping student self-beliefs about their ability to relate to peers. Though results were more nuanced and less consistent then those related to perceived teacher support, perceived peer support also emerged as a predictor of student perceptions of relatedness after controlling for other model predictors. Specifically, peer support was found to positively predict relatedness at the middle school level, but not at the high school level. These results are consistent with a study by Cox, Duncheon, and David (2009) which found both peer acceptance and friendship quality to be predictive of relatedness in a middle school sample. More generally, a larger body of research underscores the developmental importance of peer relationships at the middle school level and how these factors impact student levels of engagement and academic outcomes (Wentzel, 1998; Wentzel, Barry, & Caldwell, 2004). Given that a majority of the current peer relationship research has focused on students at either the middle or high school level (Wang & Eccles, 2012), additional research evaluating changes in peer relationships during the transition from middle to high school level using more detailed measures than were used in the present study is needed.

Student perceptions of school bullying failed to emerge as a consistent predictor of perceived academic competence across grades. Specifically, after controlling for other model predictors, student perceptions of school bullying were found to negatively predict academic competence for just two out of six grades (eighth and eleventh). These results are inconsistent with previous findings by Ma, Phelps, Lerner and Lerner (2009) and Young-Jones et al. (2015), both of whom reported that experiences of being bullied negatively predicted levels of academic competence for middle school (fifth, sixth, seventh) and college-aged students. Given that the current study assessed students in the late middle and high school age ranges, the lack of a consistent direct effect across models suggests that perceived school bullying may not be a reliable predictor of academic competence for students in these grade ranges and/or that other factors may be more influential. It was noted that, after controlling for other model factors, perceived school bullying seemed to "skip" the academic competence factor and directly predict intrinsic motivation for three out of six grades (sixth, eighth, and ninth). Examination of the by grade effect sizes for perceived school bullying on intrinsic motivation (See Table 12) displayed that the magnitude of this effect was highest in the sixth grade then decreased across each of the three grades until reaching the point of non-significance after ninth grade. Furthermore, within the eighth grade, the relationship between perceived school bullying and intrinsic motivation partially mediated academic competence.

Taken together, these results suggest that, after controlling for all other predictors of intrinsic motivation (previous standardized test scores, other school climate factors, and basic psychological needs), students in the sixth, eighth, and eleventh grades who reported higher levels of perceived school bullying also reported more inherent interest and satisfaction with completing work tasks. This result stands in contrast to research which has found bullying to be

predictive of lower levels of autonomous academic motivation (Young-Jones et al., 2015). These results may be a reflection of higher rates of bullying within a particular sub-sample of students who also tend to be more intrinsically motivated and/or they may suggest that students who are bullied may be more intrinsically motivated as a potential coping mechanism, the effects of which may deteriorate within later grades. Results from other studies, despite generally reporting a negative relationship between peer victimization and academic outcomes, suggest that there are likely complex relationships, particularly among middle school students, between peer rejection and academic outcomes (Bellmore, 2011; Juvonen, Wang, & Espinoza, 2011).

In conclusion, of the school climate factors assessed, student perceptions of teachers as supportive emerged as the most consistent predictor of student academic competence and relatedness across grades after controlling for all other model predictors (previous standardized test scores and other school climate factors). Importantly, no direct significant pathways between school climate factors and student GPA were observed across models after controlling for all other predictors. This indicates that the influence of school climate factors on GPA within the present study was entirely indirectly explained through the basic psychological needs and academic motivation variables. These findings address a gap in the current literature which previous researchers have highlighted (Thapa et al., 2013). That is, the need for research to explore the predictive utility of other relevant constructs, such as student motivation, as to better understand potential pathways through which school climate factors ultimately serve to influence student academic outcomes. The salient student motivation factors which were found to be predictive of student academic outcomes are discussed below.

Basic Psychological Needs and Motivation Orientations

Across both the middle and high school models, academic competence and relatedness emerged as the most consistent and strongest predictors of student academic motivation orientations, when controlling for the influence of all other model predictors (pervious standardized test scores, school climate factors, etc.). On average across each of the grades, model predictors (school climate factors and previous standardized test scores) accounted for 25.9% of variance in academic competence and 26.6% of the variance in relatedness. Furthermore, the average proportion of variance explained by model predictors (previous standardized test scores, school climate factors, basic psychological needs) for intrinsic motivation, extrinsic motivation, and amotivation was 56.9%, 53.0% and 23.1% respectively.

After controlling for other model predictors including previous standardized test scores, student self-perceptions of academic competence emerged as the most consistent and robust direct, positive predictor of intrinsic motivation and extrinsic motivation across all grades. These results suggest that, after controlling for other model predictors, students who view themselves as able to successfully complete school-based tasks and who perceive themselves as in control of their school based performance, are more likely to report being motivated to attend school due to their inherent interest in learning (intrinsic motivation) and/or because they see the value of school in helping them to achieve future goals (extrinsic motivation). These results are, in general, consistent with previous research (Guay, Ratelle, Roy, & Litalien, 2010; Guay & Vallerand, 1996; Marchant et al., 2001) which has found student academic competence to positively predict more autonomous forms of student motivation (intrinsic motivation).

Academic competence was also found to negatively predict amotivation after controlling for other model predictors. Within the current study, this effect was observed with more

consistency, across a wide range of grades, and with stronger effect sizes than has been reported in previous research. This suggests that, after controlling for all other model predictors, students who reported lower self-perceptions of being "good students" and who felt that they were unable to successfully complete school-based tasks, were also more likely to report feeling disengaged from school and/or to feel as if school is unimportant and a waste of time. These results are consistent with previous research (Guay & Vallerand, 1996; Vallerand et al., 1997) which has found lower levels of academic competence to predict less autonomous motivation orientations (amotivation). In comparison to academic competence, relatedness was not found to consistently predict academic motivation orientations across grades. Though the present sample consisted largely of older students, these results are inconsistent with previous research by Furrer and Skinner (2003) who reported that perceptions of relatedness to classmates amongst students in third through sixth grade predicted student self-reported engagement. These results suggest that student perceptions of relatedness to peers may function as a separate factor which does not impact student academic motivation orientations and/or that that the relationship between self-perceived relatedness and motivation orientations may become less influential as students age.

Taken together, student self-perceptions of academic competence emerged as a particularly important motivation construct in predicting student motivation orientations after controlling for other model predictors. Though findings which suggest that higher levels of academic competence positively predict intrinsic and extrinsic motivation and negatively predict amotivation are consistent with previous research, the present study expands on the current literature by including individual academic orientation variables (e.g., intrinsic, extrinsic, amotivation) as criterion variables. This stands in contrast to previous studies (Guay, Ratelle, Roy, & Litalien, 2010; Guay & Vallerand, 1996) which have often collapsed these variables into

a combined composite index (relative autonomy index) during the analysis phase. As such, the current study helps to more specifically shed light on how student perceptions of basic psychological needs, particularly academic competence, ultimately predict individual motivation orientations across grades after controlling for other model predictors.

Model Predictors of Academic Achievement

Regarding academic outcomes, on average model predictors explained 55.7% of the variance in GPA and 73.0% of the variance in current standardized test scores. GPA was most strongly and consistently positively predicted by previous standardized test scores and academic competence. Specifically, when the influence of previous standardized test scores were removed as a model predictor, the average variance in GPA explained by all other predictors (school climate factors, basic psychological needs, motivation orientations) dropped from 55.7% to 24.2%. This suggests that, of the total share of variance in GPA explained in the present study (55.7%), GPA explained roughly 55.3% while the other model predictors explained 43.4%. These results are largely consistent with findings from a study by Casillas et al. (2012) which assessed the influence of a number academic, psychosocial, and behavioral factors in predicting middle school students' early high school GPA. Similar to the current results, prior grades and standardized test scores emerged as the strongest individual predictors of GPA accounting for 55% of the variance explained in GPA while student psychosocial factors, which included tenets of student motivation (e.g., commitment to school), accounted for the second largest proportion of variance explained in GPA at 23%. The similarity between these results, particularly the proportion of variance in GPA explained by previous academic achievement, and those in the present study speak to the overall large influence of previous standardized test scores as a predictor of student future academic success and, concurrently, highlight the incremental value

added in prediction when including other salient factors that are relevant to student functioning such as tenets of school climate and academic motivation.

Regarding basic psychological needs, a direct, positive relationship between academic competence and GPA was observed across all grades. Although academic competence was generally observed to be the second strongest and most consistent positive predictor of GPA, followed by previous standardized test scores, in grades eight and nine academic competence was found to be the strongest predictor of GPA. Additionally, indirect relationships between academic competence and GPA via amotivation were observed for four out of the six grades. Further analysis revealed that amotivation partially mediated the relationship between academic competence and GPA in the ninth, tenth, and eleventh grades. The effect sizes of the indirect relationship (See Table 33) were found to be much weaker than the direct effects of academic competence on GPA, thereby suggesting that GPA is more strongly influenced directly by academic competence than indirectly via amotivation. Taken together, these results highlight the important role of student self-perceptions regarding the ability to successfully complete school-based tasks and perceptions, in general, of one as a "good student" in ultimately predicting academic achievement, after controlling for various other predictors. The role of academic competence in serving as a direct and indirect predictor of academic motivation orientations and GPA across grades after controlling for other model predictors, particularly previous standardized test scores, suggests that this construct may be particular important to target for future intervention-based research aimed at enhancing student academic achievement. Given that academic competence emerged as the strongest predictor of GPA for the eighth and ninth grades, it may be particularly important to further examine the role of this construct in relation to students' transition from middle to high school.

In contrast to academic competence, relatedness was found to negatively predict GPA for four out of six grades, suggesting that students who report higher rates of fitting in/getting along with others also have lower GPA scores. One possible explanation is that this may be representative a statistical phenomenon known as negative suppression which occurs when, after controlling for other model predictors to estimate a direct effect, the sign (positive vs. negative) of the direct effect emerges in an opposing or unexpected direction relative to the observed bivariate correlations. In the present study, the average bivariate correlation between relatedness and GPA across grades was r =.25, while the average bivariate correlation between relatedness and academic competence across grades was r =.81. Relative to the correlation between relatedness and GPA, the strong nature of the correlation between relatedness and academic competence suggests that these two variables share a large portion of common variance. When entered as co-predictors, this large common variance is controlled for and ultimately results in a negative beta weight (negative suppression effect) when using relatedness to predict GPA (Kline, 2016). As discussed by Maassen and Bakker (2001), instances of negative suppression are notoriously challenging to interpret and are usually indicative of issues regarding the independence of variables and/or the order in which variables are estimated. Potential options in managing suppression involve dropping one of the two highly correlated variables or adjusting the present model to include a direct pathway between the two variables (Maassen & Bakker, 2001). Given that the constructs of academic competence and relatedness are considered to be theoretically different and that the intentions of the present study were to evaluate the utility of self-determination theory-based motivation constructs in predicting student academic achievement, these were not considered to be viable solutions. Taken together these results suggest that, within an educational context, tenets of self-determination theory, particularly the

basic psychological needs constructs of academic competence and relatedness, may not be easily differentiated from one another. As discussed in the methods section, this point is further supported by the fact that the academic autonomy factor during the CFA process was highly correlated (r=.97) with the relatedness factor, which resulted in the need to remove this factor prior to model estimation. Taken together, these results suggest that further research is needed to better determine the extent to which each of the basic psychological needs factors can be differentiated and ultimately used to aid in the incremental prediction of student outcomes.

Regarding direct pathways between motivation orientations and GPA, after controlling for other model predictors, amotivation was found to negatively predict GPA for all three high school grades and one middle school grade. As discussed, above, this relationship was found to be partially mediated by academic competence in the high school grades. These results suggest that reporting that school is unimportant or a waste of time is predictive of having a lower GPA and that lower perceptions of academic competence (or less of a belief that one can be successful in school) plays a partial role in driving this effect. These results are consistent with results from previous research by Otis et al. (2005) and Taylor et al. (2014), which similarly reported that student levels of amotivation negatively predict academic achievement.

Neither intrinsic motivation nor extrinsic motivation were found to consistently predict GPA or standardized test scores across grades, after controlling for other model predictors. These results were inconsistent with results from a meta-analysis by Taylor and colleagues (2014) which found intrinsic motivation, in particular, to consistently predict student academic outcomes. One potential explanation for the lack of significance of intrinsic motivation as a predictor within the current study could be that the influence of these variables was controlled for by other, more salient predictors such as previous standardized test scores and student

perceptions of academic competence. Additional comparison of current results with previous research assessing relationships between specific tenets of basic psychological needs, specific motivation orientations, and outcomes is challenging given that researchers have commonly used a single self-determination theory composite score to collapse specific motivation orientations when assessing for their effects on academic outcomes (Hardre & Reeve, 2003; Allivernini & Lucidi, 2011). The fact that limited significant results emerged in the present study when evaluating for the influence of specific motivational orientations (e.g., intrinsic motivation and extrinsic motivation), may in part explain why researchers in previous studies have often resorted to using a composite score when studying this construct.

Aside from previous standardized test scores, standardized test scores were not found to be consistently predicted by included model factors across the middle or high school grades. Specifically, the average proportion of variance explained in current standardized tests scores by model predictors when excluding previous standardized test scores was 9.2% compared to 73% when including previous standardized test scores, thereby suggesting the previous standardized test scores accounted for nearly all of the influence in this outcome variable. The strong influence of previous standardized test scores helps to explain why there were limited significant effects between other model predictors and current standardized test scores after controlling for this variable.

Limitations

There are a number of design, measurement, and analysis-based limitations to the present study that should be considered when interpreting results. One data related limitation is that the data was found to not be missing at random. Although it was estimated that 78% of students in grades six through eleventh were represented in the finalized data set, subsequent analysis

revealed that particular schools were slightly over-represented at the expense of others. Regarding data collection, though temporal precedence was not violated when collecting school climate data (fall) and academic motivation data (spring), both of the motivation scales (basic psychological needs, academic motivation) were collected during the same assessment period (spring). Despite some research suggesting that basic psychological needs predict academic motivation orientations rather than the reverse (Chen & Jang, 2010; Joe et al., 2017), the ability to draw conclusions regarding effect directions is weakened given this violation in temporal precedence.

In addition to sample-based limitations, a number of analysis and measurement-based limitations emerged. In particular, high correlations amongst the autonomy and relatedness basic psychological needs factors resulted in issues related to the independence of these factors, the need to eliminate autonomy as a separate factor, and the inability to assess for the unique influence of this factor on other model variables. Similarly the likely presence of a negative suppression effect due to the strong correlation between academic competence and relatedness further complicated the ability to accurately interpret the role of relatedness in influencing student academic outcomes. In addition to these limitations, the academic competence factor was based on three items. Despite reliability estimates emerging as adequate, a small number of items and subtle variations in the questions (e.g., “I am a good student”, “I can successfully complete school-based tasks”, “I am in control of my school-based performance”) make it more challenging to understand the inherent construct being measured. As such, future research should explore relationships between academic competence and other variables using measures that are more robust. These measures should be based on the results of survey design methods that are intended to more generally assess student perceptions of school-based factors that contribute to

students feeling motivated to complete academic tasks. Additionally, the absence of previous standardized test scores for the sixth grade and issues with generating a latent factor from seventh and eighth grade previous and current standardized test score data serve as analysis-based limitations. In the sixth grade model, this limitation made it impossible to utilize previous standardized test scores as a covariate within the model in order to control for it as confounding variable. The absence of this factor, in turn, may have explained why in this model alone current standardized test scores were predicted by a variety of factors. As such, these results should be interpreted with caution. The inability to generate latent factors for the previous and current standardized test scores for the seventh and eighth grade models resulted in these factors being left as observed variables with an assumed and likely less accurate, reliability of one.

Regarding the method of analysis, it is important to note that because this study was not an experimental design, causation cannot be inferred from the results. Additionally, although consistency in result patterns across grades helps to provide evidence for the validity of variable associations, participants were representative of a single school district in which specific school climate and academic motivation measures were globally administered. As such, this limits the generalizability of the results in restricting the ability to draw conclusions beyond the district and the specific measures utilized.

Implications and Future Directions

The primary intention of this study was to explore the relationship between school climate and self-determination theory-based constructs of academic motivation in predicting student academic outcomes across grades. As such, causal relationships cannot be inferred from these results. Despite this, a number of recommendations related to school-based practices and future research directions are proposed.

After controlling for previous standardized test scores, on average across models 24.2% of the variance in student GPA was accounted for by various school climate and academic motivation predictors. This is an important finding given that these factors are likely more amenable to change than are potentially more static factors such as previous standardized test scores. Results also indicated that, although particular school climate factors played a role in predicting academic motivation factors, there were no significant direct effects between school climate factors and student GPA after controlling for the motivation factors. This result suggests that the relationship between school climate factors and academic outcomes may be more nuanced and that various others constructs, such as academic motivation, may have an important role to play within these relationships. Specifically, after controlling for other model predictors, student perceptions of teacher support emerged as the most consistent, positive predictor of academic competence and academic competence, in turn, was found to consistently predict student levels of amotivation and GPA. These results underscore the potential importance of academic competence as a construct and suggest that the school climate factors of teacher support may be a promising starting point when considering school-wide intervention efforts targeted at enhancing academic competence and, ultimately, student GPA.

Regarding teacher-student relationships, although interventions related to enhancing teacher-student relationships often target specific students with social-emotional or behavioral issues (Lind, Poppen, & Murray, 2017; Murray & Malmgren, 2005), some researchers have discussed approaches related to enhancing teacher-student relationships beyond the individual level such as at the classroom or schoolwide level (Murray & Pianta, 2007; Pianta, Hamre, & Allen, 2012). One such intervention that has the potential to be adapted to apply to a large group or school-wide level to enhance student perceived teacher support is the *Banking Time* intervention,

developed by Pianta and Hamre (2001). This intervention involves deliberately setting scheduled time to meet with a targeted student for short 5-10 minute sessions on a weekly or bi-weekly basis in order to both discuss student interests, build a stronger and more personalized relationship with students, to check in on student school-based progress, and to facilitate support in any areas in which students may be struggling. At an individual, teacher-student level, the banking time intervention has been shown to increase teacher perceptions of closeness with students and to decrease student conduct problems, however, studies have been primarily been conducted with elementary-aged students (Driscoll & Pianta, 2010).

In expanding this intervention to the secondary level to reach more students, all students and teachers at the start of the year could be surveyed to assess for their various areas of interest (e.g., sports, video games, music, etc.) and favorite/least favorite school subjects. Next, through the use of school climate measures such as the measure used in the current study, groups of students who report low levels of teacher support could be identified. Finally, individuals within the low perceived teacher support group could then be matched to their peers and to a particular teacher based upon mutual areas of interest, placed into small groups of 3-4 students, and the guidelines (e.g., dates/times) for the baking time check-ins could be set. Such an intervention has the potential to enhance perceptions that teachers care, listen, and are supportive, which ultimately may serve to influence student perceptions of academic competence and/or help to reshape student beliefs about what it means to be a successful and a "good student" in school. Furthermore, banking time sessions may facilitate friendships, increased perceptions of peer support and enhance perceptions of relatedness given that students are matched to peers based on some area of mutual interest. This may be particularly true at the middle school level given that,

in the present study, middle school students' perceptions of peer support were found to predict perceptions of relatedness after controlling for all other model predictors.

Within the district in which the data were collected, district stakeholders have implemented interventions intended to help foster student perceptions of connectedness with peers and, in particular, to support students in their transition to the middle and high school settings. Specifically, the Transition Writing Assignments and Senior Letters intervention which is currently being used involves older students writing letters about school-based challenges that they encountered when entering the middle or high school levels and how they overcame these challenges. Students in the sixth and ninth grade are instructed to select one or more of the letters and to write about what they read/how the older student managed these difficulties. This intervention has the potential to facilitate student perceptions of peer and teacher support in that the letters can help students to feel more connected to their peers who have likely faced common struggles and simultaneously help to illustrate to students the various school-based supports are be available to them. Results from the current study suggest that continued assessment and expansion of these intervention efforts as to better understand their impact on student perceptions of teacher and peer support may be important next steps.

In addition to perceived teacher and peer support, perceived school bullying was found to negatively predict student perceptions of academic competence in the eighth and eleventh grades and intrinsic motivation across the sixth, eighth, and ninth grades after controlling for other model predictors. Though additional research is needed to better understand these effects, these results preliminarily suggest that perceived experiences of being bullied may influence student perceptions about their ability to be successful in school and may also potentially influence students' inherent interest in engaging in school-based tasks. In addition to these findings, across

grades student perceptions of being bullied consistently, negatively predicted lower levels of perceived relatedness with others after controlling for other model predictors. Taken together, these results underscore the importance of school-based efforts in continuing to identify and decrease instances of school-based bullying as to foster student perceptions of relatedness and connection with other in school. Though the present study collected data on student perceptions of bullying as opposed to actual verified cases of student bullying, the district in which the data was collected has developed assessment systems and procedures to follow-up with students who report perceived bullying in order to substantiate bullying cases and to provide supports and intervention in an efficient manner.

In addition to the continued expansion of universal assessment systems to monitor bullying, school-wide efforts to regulate and decrease bullying such as School-Wide Positive Behavioral Interventions and Supports (SWPBIS) have been shown to be associated with decreased rates of student office discipline referrals and decreased rates of student bullying (Flannery, Fenning, Kato, & McIntosh, 2014; Waasdorp, Bradshaw, & Leaf, 2012). Results from the current study warrant future research efforts which more explicitly examine the relationship between verified cases of bullying and intervention efforts to reduce bullying and how these, in turn, relate to constructs of student academic motivation and academic outcomes.

Student perceptions of academic competence, or beliefs that one can successfully accomplish school-based tasks and/or that one is a "good student" predicted levels of amotivation and student GPA across grades after controlling for other model predictors. The consistency of these results across the middle and high school levels suggest that practices and intervention efforts aimed at helping students to feel as if they can be successful when engaging in academic tasks may be of particular importance in fostering student academic achievement.

To this end, a number of general, feasible strategies to enhance student perceptions of academic competence have been proposed by researchers (Gettinger & Seibert, 2002; Jimerson et al., 2006; Niemiec & Ryan, 2009). These include efforts to ensure that the curriculum is appropriately leveled to both challenge and enable students to be successful, the teaching of student study skills, the provision of student praise in conjunction with feedback, and, in general, taking strength-based approaches when providing academic support (Gettinger & Seibert, 2002; Jimerson et al., 2006; Niemic & Ryan, 2009). Furthermore, there may be particular opportunities, particularly via the vehicle of positive relationships for teachers to help students to expand and reframe perceptions of what it means to be a "good student" away from solely academic performance outcomes. That is, emphasizing student effort and the *process* through which students work to accomplish goals rather than the *outcomes* themselves (e.g., grades) may serve as important next steps for teachers when working to help reframe student self-conceptions of academic competence. As discussed by Jimerson et al. (2006), working to foster student perceptions of academic competence may be particularly important for students who are at risk for poor school performance and drop-out. The results of this study which indicate that students with lower levels of academic competence are more likely to endorse high levels of amotivation and that higher amotivation is, in turn, associated with lower GPA, further underscore the importance of helping struggling students to feel that they can be academically successful in some capacity when engaging school-related tasks.

The results of this study warrant future research in a number of areas. Specifically, the intentions of the current study were to assess if and how constructs of student academic motivation as understood from the lens of self-determination theory were predicted by tenets of school climate and how these variables, as a whole, served to influence student academic

achievement. Within the current study, results reflecting the utility of self-determination theory constructs as predictors of student academic outcomes were mixed. Specifically, though some constructs such as academic competence, relatedness, and intrinsic motivation and amotivation emerged as influential within these relationships, issues related to construct differentiation emerged. Specifically, high correlations were observed among the basic psychological needs factors of academic competence, academic autonomy, and relatedness. This required removal of the academic autonomy factor during the CFA phase and, subsequently resulted in the likely occurrence of a negative suppression effect (negative beta value) when estimating the direct pathway between relatedness and GPA. These results suggest that additional research using more robust measures may be needed to further understand if and how these specific tenets of self-determination theory differentiate and relate to student academic outcomes.

In addition to continued research aimed at examining relationships between student school climate factors and academic motivation constructs, the examination of how school-wide teacher support and school bullying interventions influence student academic competence and outcomes represents an important next step towards better understanding the implications of the current study results. Research in this area could help to further draw connections between and expand upon both the school climate and academic motivation literature bases. In addition to intervention research in this area, there are a number of associations discussed above that should be further explored and, in general, the current study should be replicated using independent samples. Specifically, a better understanding of the relationship between school bullying and intrinsic motivation, particularly at the middle school level, and the influence of perceived relatedness on student academic outcomes is needed.

Further examination of potential reciprocal effects between school climate and motivation through the use of data from subsequent years represents an additional avenue for additional research. The inclusion of additional factors as to better control for the influence of confounding variables, such as previous GPA in conjunction with previous standardized test scores, as well as additional outcome variables, particularly behavioral outcomes, serve as future goals within the current research. In general, exploring these relationships across multiple districts and with a more specific focus on particular student populations such as students with disabilities is warranted.

This study was unique in that it explored in depth relationships between two research domains which have previously been associated with student academic outcomes but, until recently, have almost exclusively been studied independently. The exploratory nature of this study which involved the assessment of numerous school climate and self-determination based academic motivation factors and the use of both middle and high school grades represents a more comprehensive examination than has been conducted in a vast majority of previous studies. Results of this study were intended to illuminate meaningful relationships between school-climate, academic motivation factors, and outcomes across various grades in order to further understanding of the predictive utility of these factors in regards to student academic achievement. Furthermore, this study was intended to help illuminate potential areas for further research and intervention. The current results support the assertion that factors of school climate and academic motivation relate in a nuanced manner to ultimately predict student academic outcomes.

In particular, results suggest that efforts to enhance teacher-student relationships may be a helpful intervention point for influencing student beliefs regarding their academic competence in

school. Furthermore, taking steps to check in with students to ensure that each student feels a sense of competence in some academic area, working to ensure the work demands are appropriately leveled, and changing perceptions regarding what it means to be a "good student" represent potential areas of opportunity for influencing student motivation orientations and academic outcomes. After controlling for all other model predictors including salient confounding variables such as previous standardized test scores, the consistency of these results across grades serves to underscore their potential importance within these relationships. These results warrant future research inquiries; particularly research that is intervention focused, with the intentions of establishing evidence for causal associations amongst the variables of perceived teacher support, school bullying, academic competence, relatedness, and academic achievement. Additional evaluation of these factors can help to yield continued insights regarding how student perceptions of both their school environment and their self-concepts influence levels of academic motivation and ultimately school outcomes.

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Table 1
Population and Sample Characteristics

Characteristic	Population Characteristics (n=3153)		Sample Characteristics (n=2463)	
	N	%	n	%
Gender				
Female	1517	48.11	1234	50.10
Male	1636	51.89	1229	49.90
Minority Status				
Non-Minority	982	31.14	855	34.71
Minority	2171	68.86	1608	65.29
Special Ed Status				
Non Special Ed	2601	82.50	2054	83.39
Special Ed	551	17.50	409	16.61
*School				
MS 1	735	19.97	649	26.35
MS 2	784	21.30	568	23.06
HS 1	893	32.47	685	27.81
HS 2	741	26.25	561	22.78
Grade				
6	499	15.83	426	17.30
7	511	16.21	403	16.36
8	509	16.14	388	15.75
9	578	18.33	439	17.82
10	559	17.73	412	16.73
11	497	15.76	395	16.04

Table 2
Factor Means by Grade and School Level

Grade Final	Perc. Teacher Support	Perc. Teachers Fairness	Perc. School Bullying	Perc. Respect for Differences	Perc. Peer Support	Academic Competence	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation	n
6	4.25	4.29	3.83	3.61	4.15	5.66	5.23	5.15	5.77	2.31	426
7	4.04	3.96	4.1	3.64	4.23	5.55	5.18	4.93	5.55	2.60	403
8	3.82	3.80	4.26	3.86	3.99	5.37	4.93	4.54	5.47	2.63	388
9	3.94	3.93	4.02	3.58	4.10	5.46	5.16	4.69	5.47	2.67	439
10	3.80	3.59	4.27	3.55	4.08	5.35	5.08	4.63	5.57	2.72	412
11	3.76	3.61	4.24	3.48	4.06	5.41	5.13	4.82	5.46	2.78	395
MS	4.04	4.02	4.07	3.71	4.12	5.53	5.11	4.87	5.60	2.51	1217
HS	3.83	3.71	4.18	3.54	4.08	5.41	5.12	4.71	5.50	2.73	1246
Total	3.93	3.85	4.12	3.62	4.10	5.47	5.12	4.79	5.55	2.62	2463

Table 3
T-test for Equality of Means Middle and High School

	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Perc. Teacher Support	6.286	2197.000	0.000*	0.204	0.032	0.140	0.267
Perc. Teachers as Fair	8.086	2209.000	0.000*	0.306	0.038	0.232	0.380
Perc. Respect for Differences	3.314	2182.000	0.001*	0.110	0.033	0.045	0.175
School Bullying	-5.161	2263.000	0.000*	-0.165	0.032	-0.228	-0.103
Perc. Peer Support	1.358	2363.000	0.175	0.047	0.034	-0.021	0.114
Academic Competence	2.609	2412.000	0.009*	0.121	0.046	0.030	0.211
Relatedness	-0.087	2420.000	0.931	-0.004	0.049	-0.101	0.092
Intrinsic Motivation	3.047	2375.000	0.002*	0.174	0.057	0.062	0.287
Extrinsic Motivation	2.304	2403.000	0.021*	0.108	0.047	0.016	0.201
Amotivation	-3.875	2402.000	0.000*	-0.218	0.056	-0.328	-0.108

Table 4
CFA Fit Indices MSCS-SV

Middle School Model (n=1217)				
FModel Fit Indexes	X2 (df)	CFI	RMSEA (90% CI)	SRMR
Model 1 (4 Factors, 31 items)	3204.700, (428)	. 794	.073 (.071-.075)	.091
Model 2 (5 Factors, 18 items) *2 within factor covariances	369.840, (123)	.967	.041(.036-.045)	.037
High School Model (n=1246)				
FModel Fit Indexes	X2 (df)	CFI	RMSEA (90% CI)	SRMR
Model 1 (4 Factors, 31 items)	4261.945, (426)	. 765	.085 (.083-.087)	.112
Model 2 (4 Factors, 18 items) *2 within factor covariances	556.886, (123)	. 952	.054 (.049-.058)	.043

Table 5
CFA Factor Loadings for MSCS-SV

		Factors Loadings									
		Perc. Teacher Support		Perc. Teacher Fairness		Perc. School Bullying		Perc. Respect for Differences		Perc. Peer Support	
Items		Middle School	High School	Middle School	High School	Middle School	High School	Middle School	High School	Middle School	High School
q3*	There are teachers at my school who care about me	0.652	0.518								
q7*	At my school, there is a teacher or other adult whom I can trust	0.653	0.589								
q30	There are teachers in my school that help me to really want to learn	0.739	0.769								
q36	At my school, there is a teacher or other adult who tells me when I do a good job	0.741	0.719								
q43	At my school, there is a teacher or other adult who listens to me when I have something to say	0.777	0.788								
q37	The adults in my school treat all students fairly			0.797	0.806						
q40	The adults in my school treat students with respect			0.779	0.810						
q42	My school handles student behavior problems fairly			0.756	0.760						
q33	Other students in my school hurt my feelings					0.686	0.720				

q34	I get hit or threatened by other students	0.739	0.810				
q35	Other students at school have spread mean rumors or lies about me	0.738	0.707				
q31*	At school, the color of my skin can get me in trouble			0.539	0.576		
q32	There is physical fighting between students at my school			0.642	0.642		
q39	Students being mean to other students (harassment) is a problem in my school			0.649	0.623		
q45*	A person's skin color can cause problems at my school			0.643	0.636		
q5	At my school, I have a friend who I can really trust					0.706	0.710
q14	I have a friend about my own age that really cares about me					0.889	0.878
q19	I have a friend about my own age who talks with me about my problems					0.665	0.776

Note: Asterisk indicates within factor correlated errors between items (e.g., q31 with q45)

Table 6
CFA Fit Indices BPNS

Middle School Model (n=1217)				
FModel Fit Indexes	X2 (df)	CFI/TLI	RMSEA (90% CI)	SRMR
Model 1 (3 Factors, 9 items)	310.901, (24)	. 947/.920	.099 (.089-.107)	.038
Model 2 (2 Factors, 7 items)	47.527, (13)	.990/.984	.041(.036-.045)	.017
High School Model (n=1246)				
FModel Fit Indexes	X2 (df)	CFI/TLI	RMSEA (90% CI)	SRMR
Model 1 (4 Factors, 31 items)	492.608 (24)	. 936/.904	.125(.116-.135)	.040
Model 2 (2 Factors, 7 items)	139.450, (13)	. 974/.958	.088 (.075-.102)	.026

Table 7
CFA Factor Loadings BPNS

	Factors Loadings			
	Academic Competence		Relatedness	
Items	Middle School	High School	Middle School	High School
I am a good student.	0.758	0.752		
I am in control of my school performance	0.793	0.847		
I am able to achieve my academic goals	0.760	0.791		
I fit in at school.			0.740	0.821
I feel free to express my ideas and opinions at school.			0.717	0.778
I get along with others at school.			0.705	0.794
I have similar interests to other students at my school			0.735	0.783

Table 8
CFA Fit Indices AMS

Middle School Model (n=1217)				
FModel Fit Indexes	X2 (df)	CFI/TLI	RMSEA (90% CI)	SRMR
Model 1 (3 Factors, 12 items)	371.047, (51)	.959/.946	.072 (.065-.079)	.049
Model 2 (3 Factors, 12 items) *2 within factor covariances	271.078 (50)	.971/.962	.060(.053-.067)	.042

High School Model (n=1246)				
FModel Fit Indexes	X2 (df)	CFI/TLI	RMSEA (90% CI)	SRMR
Model 1 (3 Factors, 12 items)	373.528 (51)	. 963/.952	.071(.065-.078)	.041
Model 2 (3 Factors, 12 items) *2 within factor covariances	329.388, (50)	. 968/.958	.067 (.060-.074)	.039

Table 9
CFA Factor Loadings AMS

		Factors Loadings					
		Intrinsic Motivation		Extrinsic Motivation		Amotivation	
	Items	Middle School	High School	Middle School	High School	Middle School	High School
g75	I go to school because I enjoy learning about my favorite subjects.	0.816	0.801				
g78	I go to school because learning new things gives me a sense of satisfaction.	0.846	0.879				
g81	I go to school because I find what we study at school interesting.	0.866	0.838				
g84	I go to school because I get a satisfied feeling in finding out about new things.	0.858	0.876				
g77	I go to school in order to get a better job later on.			0.835	0.859		
g80	I go to school because I want to lead a comfortable life later on.			0.838	0.897		
g82*	I go to school because if I left school, I would not find a job that pays enough.			0.478	0.569		
g85*	I go to school to have a better salary later.			0.650	0.800		
g76	I don't care about how I do in school.					0.675	0.755
g79	School is not important to me.					0.626	0.707
g83	I don't understand why I am in school.					0.828	0.791
g86	I feel that I am wasting my time in school.					0.858	0.777

Table 10
Middle School Correlations Between Latent Factors

	Perc. Teacher Support	Perc. Teacher Fairness	Perc. School Bullying	Perc. Respect for Differences	Perc. Peer Support	Academic Competence	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation
Perc. Teacher Support	1.000									
Perc. Teacher Fairness	0.843	1.000								
Perc. School Bullying	-0.295	-0.355	1.000							
Perc. Respect for Differences	-0.438	-0.554	0.684	1.000						
Perc. Peer Support	0.528	0.323	-0.230	-0.186	1.000					
Academic Competence	0.522	0.410	-0.288	-0.227	0.378	1.000				
Relatedness	0.489	0.385	-0.374	-0.274	0.422	0.821	1.000			
Intrinsic Motivation	0.512	0.410	-0.101	-0.235	0.243	0.679	0.619	1.000		
Extrinsic Motivation	0.334	0.277	-0.104	-0.150	0.215	0.672	0.530	0.612	1.000	
Amotivation	-0.378	-0.373	0.222	0.256	-0.228	-0.516	-0.405	-0.481	-0.493	1.000
Means	4.04	4.02	3.93	4.29	4.12	5.53	5.11	4.87	5.60	2.51

Table 11
High School Correlations Between Latent Factors

	Perc. Teacher Support	Perc. Teacher Fairness	Perc. School Bullying	Perc. Respect for Differences	Perc. Peer Support	Academic Competence	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation
Perc. Teacher Support	1.000									
Perc. Teacher Fairness	0.809	1.000								
Perc. School Bullying	-0.155	-0.183	1.000							
Perc. Respect for Differences	-0.307	-0.462	0.699	1.000						
Peer Support	0.544	0.296	-0.122	-0.105	1.000					
Academic Competence	0.376	0.304	-0.309	-0.295	0.239	1.000				
Relatedness	0.432	0.353	-0.345	-0.328	0.330	0.829	1.000			
Intrinsic Motivation	0.346	0.294	-0.222	-0.216	0.207	0.732	0.683	1.000		
Extrinsic Motivation	0.254	0.219	-0.245	-0.198	0.207	0.756	0.620	0.561	1.000	
Amotivation	-0.308	-0.255	0.164	0.161	-0.217	-0.380	-0.274	-0.298	-0.374	1.000
Means	3.83	3.71	3.82	4.46	4.08	5.41	5.12	4.71	5.50	2.73

Table 12
Middle and High School Summary of Pathways Significant (p≤.05 pathways) for Four or More Grades

Factors			Direction	Grades Significant	β Estimate Sizes (6^{th}, 7^{th}, 8^{th} , 9^{th},10^{th},11^{th})
Conceptual Model Significant Pathways					
Previous STS	→	Perc. Peer Support	Positive	6^{th} (NA), 7^{th}, 9^{th}, 10^{th}, 11^{th}	NA, 0.125, -0.022(NS), 0.189, 0.157, 0.240
Perc. Teacher Support	→	Academic Competence	Positive	6^{th}, 7^{th}, 8^{th}, 9^{th}, 10^{th}	0.444, 0.623, 0.514, 0.435, 0.357, 0.087(NS)
Perc. Teacher Support	→	Relatedness	Positive	7^{th}, 8^{th}, 9^{th}, 10^{th}	0.231(NS), 0.464, 0.441, 0.477, 0.435, 0.104(NS)
Perc. School Bullying	→	Relatedness	Negative	6^{th}, 7^{th}, 8^{th}, 10^{th}, 11^{th}	-0.142, -0.224, -0.197, -0.152(NS), -0.320, -0.316
Academic Competence	→	Intrinsic Motivation	Positive	6^{th}, 7^{th}, 8^{th}, 9^{th}, 10^{th}, 11^{th}	0.280, 0.712, 0.737, 0.681, 0.768, 0.421
Academic Competence	→	Extrinsic Motivation	Positive	6^{th}, 7^{th}, 8^{th}, 9^{th}, 10^{th}, 11^{th}	0.642, 0.715, 0.996, 0.742, 0.711, 0.812
Academic Competence	→	Amotivation	Negative	6^{th}, 7^{th}, 8^{th}, 9^{th}, 10^{th}, 11^{th}	-0.446, -0.642, -0.339, -0.358, -0.336, -0.396
Amotivation	→	GPA	Negative	6^{th}, 9^{th},10^{th},11^{th}	-0.190, -0.035(NS), -0.068(NS), -0.154, -0.149, -0.221
Additional Significant Pathways					
Previous STS	→	Academic Competence	Positive	6^{th}(NA) 7^{th}, 8^{th}, 9^{th}, 10^{th}, 11^{th}	NA, 0.209, 0.149, 0.140, 0.110 (NS), 0.130
Previous STS	→	Intrinsic Motivation	Negative	6^{th}(NA), 7^{th}, 8^{th}, 9^{th}, 10^{th}	NA, -0.216, -0.197, -0.172, -0.119, -0.077(NS)
Previous STS	→	GPA	Positive	6^{th}(NA), 7^{th}, 8^{th}, 9^{th}, 10^{th}, 11^{th}	NA, 0.633, 0.512, 0.284, 0.625, 0.425
Previous STS	→	Current STS	Positive	6^{th}(NA), 7^{th}, 8^{th}, 9^{th}, 10^{th}, 11^{th}	NA, 0.887, 0.828, 0.815, 0.997, 0.780
Perc. School Bullying	→	Intrinsic Motivation	Positive	6^{th}, 8^{th}, 9^{th}	0.226, 0.118(NS), 0.159, 0.119, -0.119 (NS), -0.046(NS)
Academic Competence	→	GPA	Positive	6^{th}, 7^{th}, 8^{th}, 9^{th}, 10^{th}, 11^{th}	0.751, 0.324, 0.775, 0.646, 0.489, 0.374
Relatedness	→	GPA	Negative	6^{th}, 8^{th}, 9^{th}, 10^{th}	-0.157, -0.145(NS), -0.224, -0.251, -0.214, -0.100(NS)

Note: All B estimates significant at the p≤.05 level. Red text signifies estimates at the MS level, blue text signifies estimates at the HS level. NS = Effect not significant, NA = Effect not estimated in mode

Table 13
Middle School Summary of Significant Pathways (two or more grades significant)

Pathway			Direction	Grades Significant	Range of β Estimate Sizes (6^{th},7^{th},8^{th})
Theorized Model Significant Pathways					
Previous STS	→	Perc. School Bullying	Negative	6^{th} (NA), 7^{th}, 8^{th}	NS, -0.140, -0.262
Perc. Teacher Support	→	Academic Competence	Positive	6^{th}, 7^{th}, 8^{th}	0.444, 0.623, 0.514
Perc. Teacher Support	→	Relatedness	Positive	7^{th}, 8^{th}	NS, 0.464, 0.441
Perc. School Bullying	→	Relatedness	Negative	6^{th}, 7^{th}, 8^{th}	-0.142, -0.224, -0.197
Perc. Peer Support	→	Relatedness	Positive	6^{th}, 7^{th}	0.304, 0.213, NS
Academic Competence	→	Intrinsic Motivation	Positive	6^{th}, 7^{th}, 8^{th}	0.280, 0.712, 0.737
Academic Competence	→	Extrinsic Motivation	Positive	6^{th}, 7^{th}, 8^{th}	0.642, 0.715, 0.996
Academic Competence	→	Amotivation	Negative	6^{th}, 7^{th}, 8^{th}	-0.446, -0.642, -0.339
Additional Significant Pathways					
Previous STS	→	Academic Competence	Positive	6^{th} (NA), 7^{th}, 8^{th}	NA, 0.209, 0.149
Previous STS	→	Intrinsic Motivation	Negative	6^{th} (NA), 7^{th}, 8^{th}	NA, -0.216, -0.197
Previous STS	→	GPA	Positive	6^{th}(NA), 7^{th}, 8^{th}	NA, 0.633, 0.512
Previous STS	→	Current STS	Positive	6^{th}(NA), 7^{th}, 8^{th}	NA, 0.887, 0.828
Perc. School Bullying	→	Intrinsic Motivation	Positive	6^{th}, 8^{th}	0.226, 0.118(NS), 0.159
Academic Competence	→	Current STS	Positive	6^{th},7^{th}, 8^{th}	0.431, 0.324, 0.283
Academic Competence	→	GPA	Positive	6^{th}, 7^{th}, 8^{th}	0.751, 0.324, 0.775
Relatedness	→	GPA	Negative	6^{th}, 8^{th}	-0.157, -0.145(NS), -0.224

Table 14
High School Summary of Most Common Pathways (two or more grades significant)

Factors			Direction	Grades Significant	Range of β Estimate Sizes (9^{th},10^{th},11^{th})
Theorized Model Significant Pathways					
Previous STS	→	Perc. Peer Support	Positive	9^{th}, 10^{th}, 11^{th}	0.189, 0.157, 0.240
Perc. Teacher Support	→	Academic Competence	Positive	9^{th}, 10^{th}	0.435, 0.357, 0.087(NS)
Perc. Teacher Support	→	Relatedness	Positive	9^{th}, 10^{th}	0.477, 0.435, 0.104(NS)
Perc. School Bullying	→	Relatedness	Negative	10^{th}, 11^{th}	0.152(NS), -0.320, -0.316
Academic Competence	→	Intrinsic Motivation	Positive	9^{th}, 10^{th}, 11^{th}	0.681, 0.768, 0.421
Academic Competence	→	Extrinsic Motivation	Positive	9^{th}, 10^{th}, 11^{th}	0.742, 0.711, 0.812
Academic Competence	→	Amotivation	Negative	9^{th}, 10^{th}, 11^{th}	-0.358, -0.336, -0.396
Amotivation	→	GPA	Negative	9^{th}, 10^{th}, 11^{th}	-0.154, -0.149, -0.221
Additional Significant Pathways					
Previous STS	→	Academic Competence	Positive	9^{th}, 11^{th}	0.140, 0.110 (NS), 0.130
Previous STS	→	Intrinsic Motivation	Negative	9^{th}, 10^{th}	-0.172, -0.119, -0.077(NS)
Previous STS	→	Amotivation	Negative	9^{th}, 10^{th}, 11^{th}	-0.154, -0.149, -0.221
Previous STS	→	GPA	Positive	9^{th}, 10^{th}, 11^{th}	0.284, 0.625, 0.425
Previous STS	→	Current STS	Positive	9^{th}, 10^{th}, 11^{th}	0.815, 0.997, 0.780
Academic Competence	→	GPA	Positive	9^{th}, 10^{th}, 11^{th}	0.646, 0.489, 0.374
Relatedness	→	GPA	Negative	9^{th}, 10^{th}	0.251, -0.214, -0.100(NS)

Table 15
Sixth Grade Model Fit Indices

Sixth Grade (n=426)				
Model Fit Indexes	X2 (df)	RMSEA (90% CI)	CFI/TLI	SRMR
		Measurement Model		
(MSCS-SV, BPN, AM, GPA, STS)	1102.602, (672)	.039 (.035-.043)	. 942/.933	.046
		Conceptual Model		
(MSCS-SV, BPN, AM, GPA, STS)	1141.469 (694)	.039 (.035-.043)	.940/.932	.051
		Trimmed/Finalized Model		
(MSCS-SV, BPN, AM, GPA, STS)	1166.050 (704)	.039 (.035-.043)	.938/.931	.059

Table 16
Sixth Grade Path Model Standardized Regression Coefficients

Model Factors			Estimates (β)	SE	P Value
Theorized Model Significant Pathways					
Perc. Teacher Support	→	Academic Competence	0.444	0.047	0.000
Perc. School Bullying	→	Relatedness	-0.142	0.055	0.010
Perc. Peer Support	→	Relatedness	0.304	0.056	0.000
Academic Competence	→	Intrinsic Motivation	0.280	0.098	0.004
Academic Competence	→	Extrinsic Motivation	0.642	0.037	0.000
Academic Competence	→	Amotivation	-0.446	0.045	0.000
Relatedness	→	Intrinsic Motivation	0.362	0.091	0.000
Intrinsic Motivation	→	Current STS	-0.539	0.072	0.000
Intrinsic Motivation	→	GPA	-0.371	0.064	0.000
Extrinsic Motivation	→	Current STS	0.211	0.065	0.001
Amotivation	→	Current STS	-0.229	0.062	0.000
Amotivation	→	GPA	-0.190	0.054	0.000
Additional Significant Pathways					
Perc. Teacher Support	→	Intrinsic Motivation	0.224	0.061	0.000
Perc. Teacher Support	→	Current STS	-0.292	0.108	0.007
Perc. Teacher Fairness	→	Current STS	0.266	0.106	0.012
Perc. School Bullying	→	Intrinsic Motivation	0.226	0.055	0.000
Academic Competence	→	Current STS	0.431	0.079	0.000
Academic Competence	→	GPA	0.751	0.084	0.000
Relatedness	→	GPA	-0.157	0.072	0.029

Note: All within construct factors are correlated

Table 17
Sixth Grade R-Square Estimates

Variable	Estimate	S.E.	P-Value	Interpretation
Academic Competence	0.197	0.042	0.000	Significant: 19.7% of the variance in Competence is explained by model predictors
Relatedness	0.142	0.039	0.000	Significant: 14.2% of the variance in Relatedness is explained by model predictors
Intrinsic Motivation	0.460	0.044	0.000	Significant: 46.0% of the variance in Intrinsic Motivation is explained by model predictors
Extrinsic Motivation	0.412	0.048	0.000	Significant: 41.2% of the variance in Extrinsic Motivation is explained by model predictors
Amotivation	0.199	0.040	0.000	Significant: 19.9% of the variance in Amotivation is explained by model predictors
Current STS	0.311	0.052	0.000	Significant: 31.1% of the variance in Standardized Test Scores is explained by model predictors
GPA	0.356	0.047	0.000	Significant: 35.6% of the variance in GPA is explained by model predictors.

Table 18
Seventh Grade Model Fit Indices

Seventh Grade (n=403)				
Model Fit Indexes	X2 (df)	RMSEA (90% CI)	CFI/TLI	SRMR
	Measurement Model			
(PSTS, MSCS-SV, BPN, AM, GPA)	1151.217, (662)	.043 (.039-.047)	. 941/.930	.051
	Conceptual Model			
(PSTS, MSCS-SV, BPN, AM, GPA)	1223.805 (688)	.048 (.043-.052)	.929/.919	.058
	Trimmed/Finalized Model			
(PSTS, MSCS-SV, BPN, AM, GPA)	1227.148 (692)	.047 (.043-.052)	.929/.920	.063

Table 19
Seventh Grade Path Model Standardized Regression Coefficients

Model Factors			Estimates (β)	SE	P Value
Theorized Model Significant Pathways					
Previous STS	→	Perc. Teacher Fairness	0.092	0.044	0.035
Previous STS	→	Perc. School Bullying	-0.140	0.056	0.013
Previous STS	→	Perc. Peer Support	0.125	0.052	0.015
Perc. Teacher Support	→	Academic Competence	0.623	0.041	0.000
Perc. Teacher Support	→	Relatedness	0.464	0.059	0.000
Perc. School Bullying	→	Relatedness	-0.244	0.052	0.000
Perc. Peer Support	→	Relatedness	0.213	0.059	0.000
Academic Competence	→	Intrinsic Motivation	0.712	0.056	0.000
Academic Competence	→	Extrinsic Motivation	0.715	0.037	0.000
Academic Competence	→	Amotivation	-0.642	0.044	0.000
Additional Significant Pathways					
Previous STS	→	Academic Competence	0.209	0.043	0.000
Previous STS	→	Intrinsic Motivation	-0.216	0.041	0.000
Previous STS	→	Current STS	0.887	0.012	0.000
Previous STS	→	MS GPA	0.633	0.030	0.000
Perc. Teacher Support	→	Intrinsic Motivation	0.226	0.066	0.001
Peer Support	→	Intrinsic Motivation	-0.134	0.052	0.010
Academic Competence	→	MS GPA	0.324	0.038	0.000

Note: All within construct factors are correlated with the exception of school bullying with peer support due to non-significance.

Table 20
Seventh Grade R-Square Estimates

Variable	Estimate	S.E.	P-Value	Interpretation
Perc. Teacher Fairness	0.008	0.008	0.293	Non-significant: 0.8% of the variance in Teacher Fairnessis explained by model predictors
Perc. School Bullying	0.020	0.016	0.212	Non-significant: 2.0% of the variance in School Bullying is explained by model predictors
Perc. Peer Support	0.016	0.013	0.225	Non-significant: 1.6% of the variance in Peer Support is explained by model predictors
Academic Competence	0.431	0.051	0.000	Significant: 43.1% of the variance in Competence is explained by model predictors
Relatedness	0.513	0.053	0.000	Significant: 51.3% of the variance in Relatedness is explained by model predictors
Intrinsic Motivation	0.662	0.045	0.000	Significant: 66.2% of the variance in Intrinsic Motivation is explained by model predictors
Extrinsic Motivation	0.511	0.053	0.000	Significant: 51.1% of the variance in Extrinsic Motivation is explained by model predictors
Amotivation	0.412	0.056	0.000	Significant: 41.2% of the variance in Amotivation is explained by model predictors
GPA (controlling for the influence of previous STS)	0.176	0.034	0.000	Significant: 17.6% of the variance in GPA is explained by model predictors, excluding previous STS.
GPA (including the influence of previous STS)	0.592	0.035	0.000	Significant: 59.2% of the variance in GPA is explained by all model predictors.
Current Standardized Test Score (controlling for the influence of previous STS)	N/A	-	-	Current STS was not significantly predicted by model predictors when previous STS was excluded.
Current Standardized Test Scores (including the influence of previous STS)	0.787	0.021	0.000	Significant: 78.7% of the variance in Current STS is explained by model predictors.

Table 21
Eighth Grade Model Fit Indices

Eighth Grade (n=388)				
Models	X2 (df)	RMSEA (90% CI)	CFI/TLI	SRMR
		Measurement Model		
(PSTS, MSCS-SV, BPN, AM, GPA, STS)	1094.178, (662)	.041 (.037-.045)	.941/.931	.048
		Conceptual Model		
(PSTS, MSCS-SV, BPN, AM, GPA, STS)	1008.790 (687)	.039 (.034-.044)	.946/.938	.058
		Trimmed/Finalized Model		
(PSTS, MSCS-SV, BPN, AM, GPA,STS)	1027.879 (704)	.039 (.034-.044)	.945/.939	.061

Table 22
Eighth Grade Path Model Standardized Regression Coefficients

Model Factors			Estimates (β)	SE	P Value
Theorized Model Significant Pathways					
Previous STS	→	Perc. School Bullying	-0.262	0.061	0.000
Perc. Teacher Support	→	Perc. Academic Competence	0.514	0.052	0.000
Perc. Teacher Support	→	Relatedness	0.441	0.058	0.000
Perc. School Bullying	→	Academic Competence	-0.150	0.069	0.030
Perc. School Bullying	→	Relatedness	-0.197	0.071	0.006
Academic Competence	→	Intrinsic Motivation	0.737	0.041	0.000
Academic Competence	→	Extrinsic Motivation	0.996	0.128	0.000
Relatedness	→	Extrinsic Motivation	-0.339	0.137	0.013
Academic Competence	→	Amotivation	-0.493	0.052	0.000
Extrinsic Motivation	→	MS GPA	-0.157	0.067	0.020
Additional Significant Pathways					
Previous STS	→	Academic Competence	0.149	0.044	0.001
Previous STS	→	Intrinsic Motivation	-0.197	0.051	0.000
Previous STS	→	Current STS	0.828	0.022	0.000
Previous STS	→	MS GPA	0.512	0.043	0.000
Perc. School Bullying	→	Intrinsic Motivation	0.159	0.063	0.012
Perc. School Bullying	→	Extrinsic Motivation	0.320	0.064	0.000
Academic Competence	→	Current STS	0.283	0.078	0.004
Relatedness	→	Current STS	-0.224	0.078	0.004
Academic Competence	→	MS GPA	0.775	0.152	0.000
Relatedness	→	MS GPA	-0.354	0.130	0.006

Note: All within construct factors were correlated with the exception of school bullying with peer support, respect for differences and peer support, and intrinsic motivation with extrinsic motivation, due to non-significance.

Table 23
Eighth Grade R-Square Estimates

Latent Variable	Estimate	S.E.	P-Value	Interpretation
Perc. School Bullying	0.069	0.032	0.031	Significant: 6.9% of the variance in School Bullying is explained by model predictors
Academic Competence	0.341	0.053	0.000	Significant: 34.1% of the variance in Competence is explained by model predictors
Relatedness	0.256	0.054	0.000	Significant: 25.6% of the variance in Relatedness is explained by model predictors
Intrinsic Motivation	0.508	0.053	0.000	Significant: 50.8% of the variance in Intrinsic Motivation is explained by model predictors
External Motivation	0.542	0.063	0.000	Significant: 54.2% of the variance in External Motivation is explained by model predictors
Amotivation	0.243	0.051	0.000	Significant: 24.3% of the variance in Amotivation is explained by model predictors
GPA (controlling for the influence of previous STS)	0.240	0.048	0.000	Significant: 24.0% of the variance in GPA is explained by model predictors, excluding previous STS.
GPA (including the influence of previous STS)	0.566	0.048	0.000	Significant: 56.6% of the variance in GPA is explained by all model predictors
Current Standardized Test Score (controlling for the influence of previous STS)	0.027	0.016	0.089	Non-Significant: After removing the influencing of previous STS, the proportion of variance explained in current STS by other model predictors was non-significant.
Current Standardized Test Scores (including the influence of previous STS)	0.780	0.025	0.000	Significant: 78.0% of the variance in Current Standardized Test Scores is explained by all model predictors

Table 24
Ninth Grade Model Fit Indices

Ninth Grade (n=388)				
Models	X2 (df)	RMSEA (90% CI)	CFI/TLI	SRMR
		Measurement Model		
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1224.646, (739)	.039 (.035-.042)	. 947/.938	.043
		Conceptual Model		
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1264.390 (764)	.039 (.035-.042)	.946/.939	.046
		Trimmed/Finalized Model		
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1298.047 (781)	.039 (.035-.042)	.944/.938	.052

Table 25
Ninth Grade Path Model Standardized Regression Coefficients

Model Factors		Estimates (β)	SE	P Value
Theorized Model Significant Pathways				
Previous STS	→ Perc. Peer Support	0.189	0.057	0.000
Perc. Teacher Support	→ Academic Competence	0.435	0.046	0.000
Perc. Teacher Support	→ Relatedness	0.477	0.045	0.000
Academic Competence	→ Intrinsic Motivation	0.681	0.039	0.000
Academic Competence	→ Extrinsic Motivation	0.742	0.028	0.000
Academic Competence	→ Amotivation	-0.358	0.052	0.000
Intrinsic Motivation	→ HS GPA	-0.211	0.065	0.001
Extrinsic Motivation	→ Current STS	0.139	0.041	0.001
Amotivation	→ HS GPA	-0.154	0.046	0.001
Additional Significant Pathways				
Previous STS	→ Academic Competence	0.140	0.042	0.001
Previous STS	→ Intrinsic Motivation	-0.172	0.043	0.000
Previous STS	→ Current STS	0.815	0.034	0.000
Previous STS	→ HS GPA	0.284	0.052	0.000
Perc. Teacher Support	→ Intrinsic Motivation	0.187	0.048	0.000
Perc. School Bullying	→ Intrinsic Motivation	0.119	0.045	0.008
Perc. Peer Support	→ Amotivation	-0.153	0.053	0.004
Academic Competence	→ HS GPA	0.646	0.120	0.000
Relatedness	→ HS GPA	-0.251	0.100	0.012

Note: All within construct factors are correlated with the exception of intrinsic motivation with extrinsic motivation due to non-significance.

Table 26

Ninth Grade R-Square Estimates

Variable	Estimate	S.E.	P-Value	Interpretation
Perc. Peer Support	0.036	0.022	0.097	Non-significant at .05 level: 3.6% of the variance in Peer Support is explained by model predictors
Academic Competence	0.216	0.042	0.000	Significant: 21.6% of the variance in Competence is explained by model predictors
Relatedness	0.227	0.043	0.000	Significant: 22.7% of the variance in Relatedness is explained by model predictors
Intrinsic Motivation	0.575	0.041	0.000	Significant: 57.5% of the variance in Intrinsic Motivation is explained by model predictors
Extrinsic Motivation	0.550	0.042	0.000	Significant: 55.0% of the variance in Extrinsic Motivation is explained by model predictors
Amotivation	0.181	0.039	0.000	Significant: 18.1% of the variance in Amotivation is explained by model predictors
GPA (controlling for the influence of previous STS)	0.221	0.044	0.000	Significant: 22.1% of the variance in GPA is explained by model predictors, excluding previous STS.
GPA (including the influence of previous STS)	0.330	0.046	0.000	Significant: 33.0% of the variance in GPA is explained by model predictors.
Current Standardized Test Score (controlling for the influence of previous STS)	0.041	0.019	0.026	Significant: 4.1% of the variance in Standardized Test Scores is explained by model predictors
Current Standardized Test Scores (including the influence of previous STS)	0.712	0.051	0.000	Significant: 71.2% of the variance in Standardized Test Scores is explained by model predictors (previous STS)

Table 27
Tenth Grade Model Fit Indices

	Tenth Grade (n=412)			
Models	X2 (df)	RMSEA (90% CI)	CFI/TLI	SRMR
	Measurement Model			
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1377.678, (739)	.046 (.042-.050)	. 933/.921	.048
	Conceptual Model			
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1417.057 (765)	.045 (.042-.049)	.931/.923	.054
	Trimmed/Finalized Model			
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1476.782 (782)	.046 (.043-.050)	.927/.919	.070

Table 28

Tenth Grade Path Model Standardized Regression Coefficients

Model Factors		Estimates (β)	SE	P Value
Theorized Model Significant Pathways				
Previous STS	→ Perc. Teacher Support	0.150	0.058	0.015
Previous STS	→ Perc. Peer Support	0.157	0.059	0.008
Perc. Teacher Support	→ Academic Competence	0.357	0.051	0.000
Perc. Teacher Support	→ Relatedness	0.435	0.048	0.000
Academic Competence	→ Intrinsic Motivation	0.768	0.027	0.000
Academic Competence	→ Extrinsic Motivation	0.711	0.030	0.000
Academic Competence	→ Amotivation	-0.336	0.050	0.000
Intrinsic Motivation	→ Current STS	0.128	0.036	0.000
Amotivation	→ HS GPA	-0.149	0.040	0.000
Additional Significant Pathways				
Previous STS	→ Intrinsic Motivation	-0.119	0.041	0.004
Previous STS	→ Amotivation	-0.192	0.053	0.000
Previous STS	→ Current STS	0.997	0.022	0.000
Previous STS	→ HS GPA	0.625	0.035	0.000
Academic Competence	→ HS GPA	0.489	0.081	0.000
Relatedness	→ HS GPA	-0.214	0.078	0.006

Note: All within construct factors are correlated with the exception of intrinsic motivation with extrinsic motivation and amotivation, and extrinsic motivation with amotivation, due to non-significance.

Table 29

Tenth Grade R-Square Estimates

Variable	Estimate	S.E.	P-Value	Interpretation
Perc. Teachers Support	0.020	0.016	0.225	Non-Significant: 2.0% of the variance in Teachers Care is explained by model predictors
Peer Support	0.025	0.019	0.185	Non-Significant: 2.5% of the variance in Peer Support is explained by model predictors
Competence	0.128	0.036	0.000	Significant: 12.8% of the variance in Competence is explained by model predictors
Relatedness	0.189	0.042	0.000	Significant: 18.9% of the variance in Relatedness is explained by model predictors
Intrinsic Motivation	0.595	0.041	0.000	Significant: 59.5% of the variance in Intrinsic Motivation is explained by model predictors
Extrinsic Motivation	0.506	0.043	0.000	Significant: 50.6% of the variance in Extrinsic Motivation is explained by model predictors
Amotivation	0.157	0.037	0.000	Significant: 15.7% of the variance in Amotivation is explained by model predictors
GPA (controlling for the influence of previous STS)	0.256	0.041	0.000	Significant: 25.6% of the variance in GPA is explained by model predictors, excluding previous STS.
GPA (including the influence of previous STS)	0.615	0.041	0.000	Significant: 61.5% of the variance in GPA is explained by model predictors.
Current Standardized Test Score (controlling for the influence of previous STS)	0.003	0.012	0.819	Non-Significant: After removing the influence of previous STS, the proportion of variance explained in current STS by other model predictors is non-significant
Current Standardized Test Scores (including the influence of previous STS)	0.989	0.042	0.000	Significant: 98.9% of the variance in Current STS is explained by model predictors (previous STS)

Table 30
Eleventh Grade Model Fit Indices

	Eleventh Grade (n=395)			
Models	X2 (df)	RMSEA (90% CI)	CFI/TLI	SRMR
	Measurement Model			
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1469.883, (739)	.050 (.046-.054)	. 929/.917	.045
	Conceptual Model			
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1490.976 (765)	.049 (.045-.053)	.929/.920	.046
	Trimmed/Finalized Model			
(PSTS, MSCS-SV, BPN, AM, STS, GPA)	1508.081 (782)	.048 (.045-.052)	.929/.922	.049

Table 31

Eleventh Grade Standardized Regression Coefficients

Model Factors			Estimates (β)	SE	P Value
Theorized Model Significant Pathways					
Previous STS	→	Perc. Teacher Support	0.139	0.061	0.024
Previous STS	→	Perc. Peer Support	0.240	0.058	0.000
Perc. Teacher Fairness	→	Academic Competence	0.329	0.049	0.000
Perc. Teacher Fairness	→	Relatedness	0.335	0.049	0.000
Perc. School Bullying	→	Academic Competence	-0.304	0.051	0.000
Perc. School Bullying	→	Relatedness	-0.316	0.050	0.000
Perc. Peer Support	→	Relatedness	0.143	0.040	0.000
Academic Competence	→	Intrinsic Motivation	0.421	0.083	0.000
Academic Competence	→	Extrinsic Motivation	0.812	0.023	0.000
Academic Competence	→	Amotivation	-0.262	0.058	0.000
Relatedness	→	Intrinsic Motivation	0.396	0.083	0.000
Extrinsic Motivation	→	HS GPA	-0.209	0.077	0.007
Amotivation	→	Current STS	-0.149	0.050	0.003
Amotivation	→	HS GPA	-0.221	0.052	0.000
Additional Significant Pathways					
Previous STS	→	Academic Competence	0.130	0.040	0.001
Previous STS	→	Amotivation	-0.142	0.061	0.021
Previous STS	→	Current STS	0.780	0.034	0.000
Previous STS	→	HS GPA	0.425	0.047	0.000
Perc. Teacher Support	→	Amotivation	-0.219	0.058	0.000
Academic Competence	→	HS GPA	0.374	0.076	0.000

Note: All within construct factors are correlated with the exception of teacher support with school bullying, Teacher Fairnesswith school bullying, school bullying with peer support, respect for differences with peer support, intrinsic motivation with extrinsic motivation, and intrinsic motivation with amotivation, due to non-significance.

Table 32
Eleventh Grade R-Square Estimates

Variable	Estimate	S.E.	P-Value	Interpretation
Perc. Teacher Support	0.019	0.017	0.258	Non- Significant: 1.9% of the variance in Teacher Support is explained by model predictors.
Perc. Peer Support	0.058	0.028	0.038	Significant: 5.8% of the variance in Peer Support is explained by model predictors
Academic Competence	0.238	0.043	0.000	Significant: 23.8% of the variance in Competence is explained by model predictors
Relatedness	0.273	0.044	0.000	Significant: 27.3% of the variance in Relatedness is explained by model predictors
Intrinsic Motivation	0.611	0.036	0.000	Significant: 61.1% of the variance in Intrinsic Motivation is explained by model predictors
Extrinsic Motivation	0.659	0.037	0.000	Significant: 65.9% of the variance in Extrinsic Motivation is explained by model predictors
Amotivation	0.191	0.042	0.000	Significant: 19.1% of the variance in Amotivation is explained by model predictors
GPA (controlling for the influence of previous STS)	0.200	0.039	0.000	Significant: 20.0% of the variance in GPA is explained by model predictors, excluding previous STS.
GPA (including the influence of previous STS)	0.681	0.047	0.000	Significant: 68.1% of the variance in Standardized Test Scores is explained by model predictors
Current Standardized Test Score (controlling for the influence of previous STS)	0.078	0.030	0.009	Significant: 7.8% of the variance in Standardized Test Scores is explained by model predictors, excluding previous STS.
Current Standardized Test Scores (including the influence of previous STS)	0.381	0.045	0.000	Significant: 38.1% of the variance in GPA is explained by model predictors.

Table 33
Mediation Analysis for Shared Effects Across Middle and High School

		7th	8th	9th	10th	11th
Direct	Previous STS to Intrinsic Mot	B=-0.260, 95% CI = -0.349 to -0.174	B=-0.192, 95% CI = -0.296 to -0.095	X	X	X
Indirect	Previous STS to Intrinsic Mot via Comp	B=0.216, 95% CI = 0.135 to 0.305	B=0.135, 95% CI = 0.042 to 0.231	X	X	X
Direct	Perc. School Bullying to Intrinsic Mot	X	B=-0.164, 95% CI = 0.049 to 0.280	X	X	X
Indirect	Perc. School Bullying to Intrinsic Mot via Comp	X	B=-0.179, 95% CI = -0.309 to -0.068	X	X	X
Direct	Comp to HSGPA	X	X	B=0.357, 95% CI =0.241 to 0.474	B=0.330, 95% CI = 0.217 to 0.422	B=0.291, 95% CI =0.188 to 0.411
Indirect	Comp to HSGPA via Amot	X	X	B=0.060, 95% CI = 0.014 to 0.119	B=0.105, 95% CI = 0.066 to 0.162	B=0.098, 95% CI = 0.048 to 0.166

Note: x indicates that indirect paths were not observed between these variables for this grade.

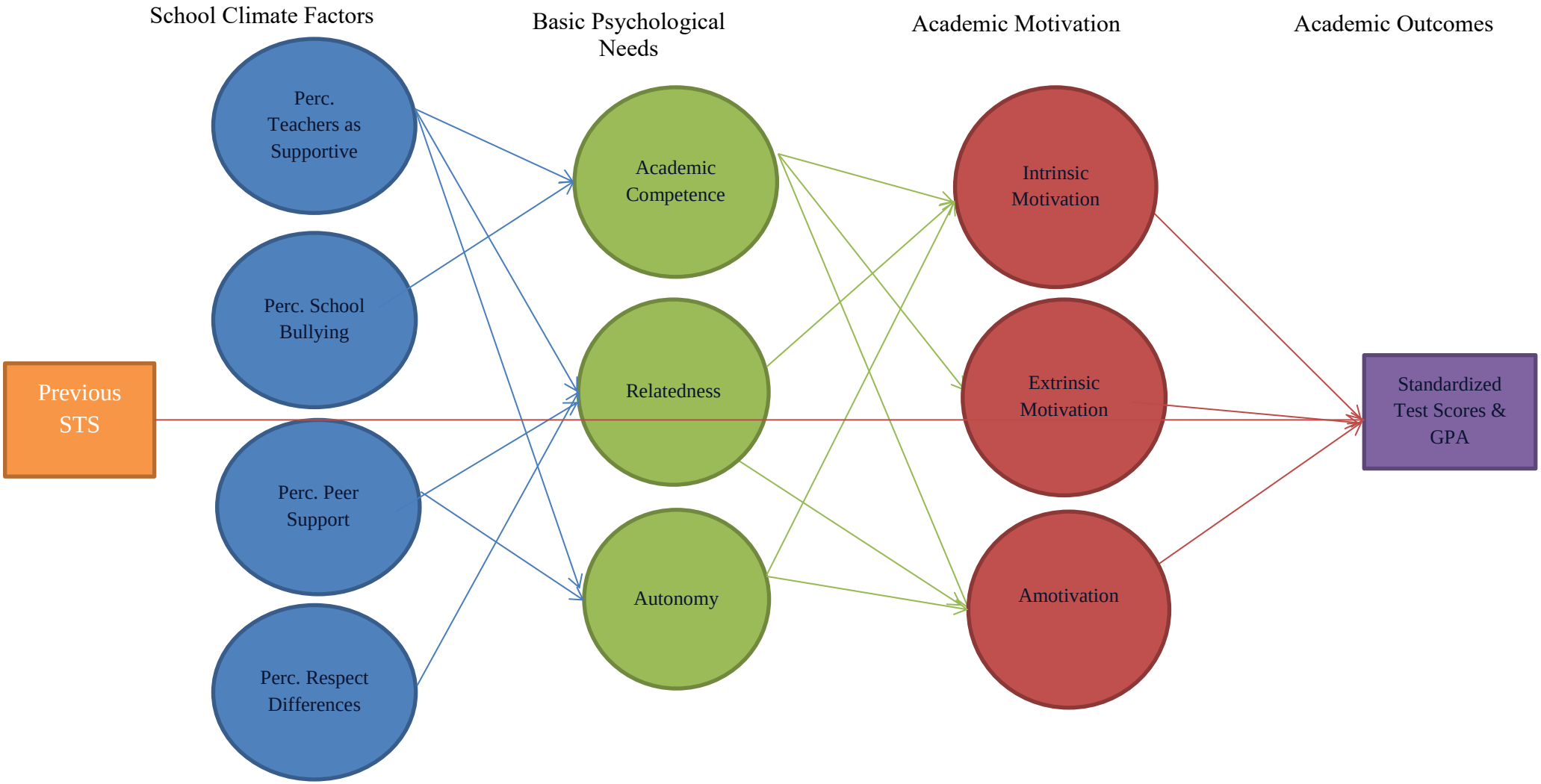
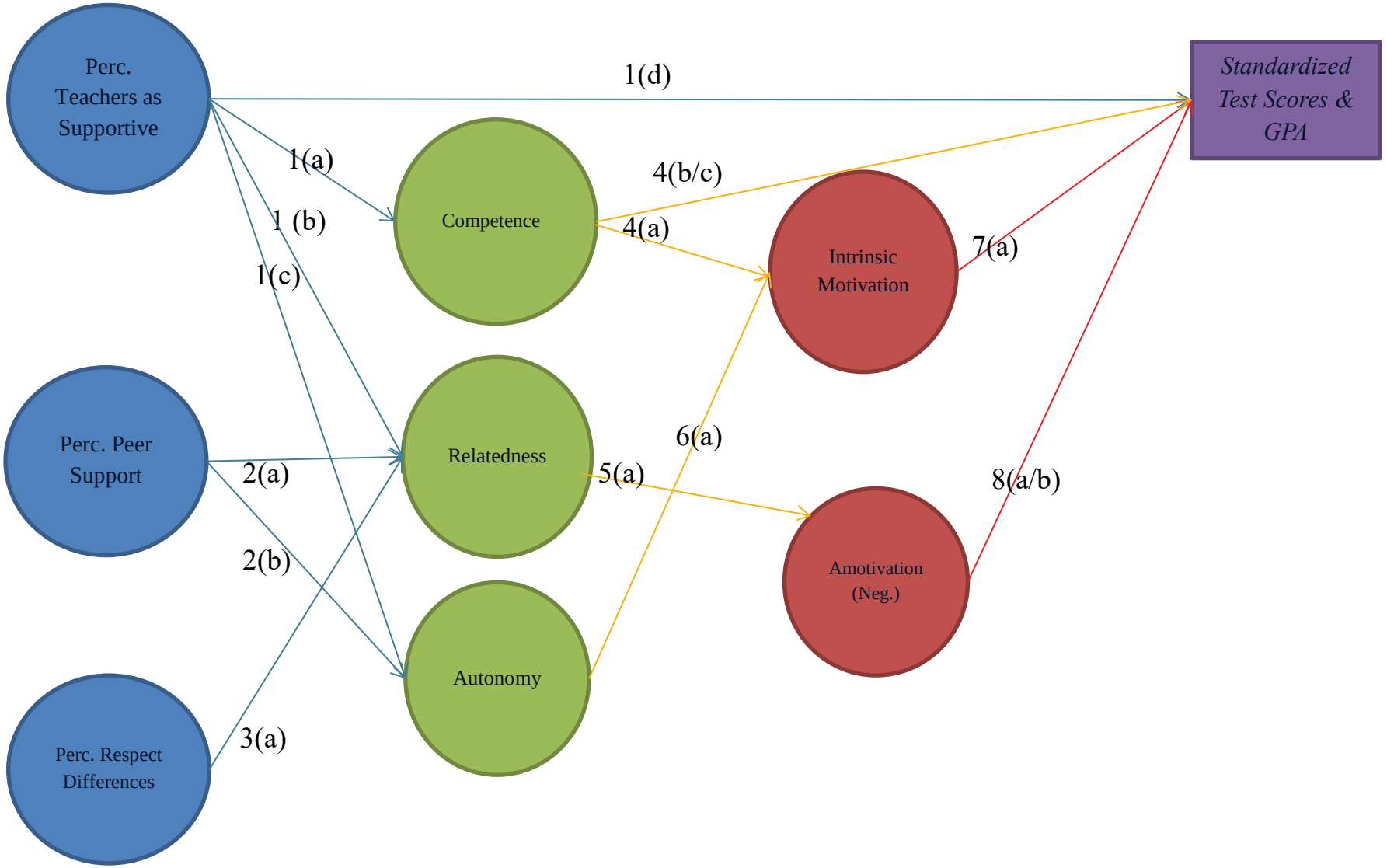


Figure 1. Model one, latent full mediation model. Hypothesized models of school climate, basic psychological needs, academic motivation, and student outcome factors.


Perc. Teachers as Supportive
Perc. Peer Support
Perc. Respect Differences
Competence
Relatedness
Autonomy
Intrinsic Motivation
Amotivation (Neg.)
Standardized Test Scores & GPA
1(d)
1(a)
1 (b)
1(c)
2(a)
2(b)
3(a)
4(b/c)
4(a)
5(a)
6(a)
7(a)
8(a/b)

School Contextual Factors → Self-Perceptions	**Self-Perceptions→ Student Academic Motivations**	**Student Academic Motivation → Outcomes**
All Effects are β's unless specified 1. (a) Teacher Aut support → School Competence (.33) (Guay & Vallerand, 1997) HS (b) Teacher Support → Relatedness (.31, .33) (Connel et al., 1995) 7th, 8th,9th (c) Teacher Context (Teacher Interest and Cares) → Perceived Control (.52) (Skinner et al., 1990) Elementary (d) Support from Teachers →Higher Academic GPA (.15) (Alivernini & Lucidi, 2011) 2. (a) Peer Acceptance → Relatedness (.37) (Cox, Duncheon, & McDavid, 2009) Middle School (b) Peer Affiliation → Amotiavation Task Value (-.32) (Legault, 2006) 3. (a) Social Climate (Mutual Respect) → BPN Composite (.55)(Joe-Hiver, 2017)	4. (a) Competence →Self-Determined School Motivation (.33) (Guay & Vallerand, 1996) (b) Competence → Achievement (Exam Scores) (.07) (Joe-Hiver, 2017) (c) Competence → GPA (.48) (Hadre and Reeve, 2003) 5. (a) Relatedness to Peers →Amotivation (-.31) (Legualt et al., 2006) HS 6. (a) Teach Autonomy Support → Intrinsic Motivation (.27) (Gillet, 2011) 9-17	7. (a) Intrinsic Motivation-→ School Achivement (GPA) (Grades) (Taylor et al., 2014) (*d* =.27) 8. (a) Amotivation (Ability, Effort) → SR GPA (-.39, -.34) (Legault, 2006) HS (b) Amotivation → GPA (cohen's d = -.61) (Taylor et al., 2014)

Figure 2. Summary of strongest research supported pathways retained, β effect sizes >.25.. Studies reflecting significant pathways are discussed in literature text and available in a summary table upon request

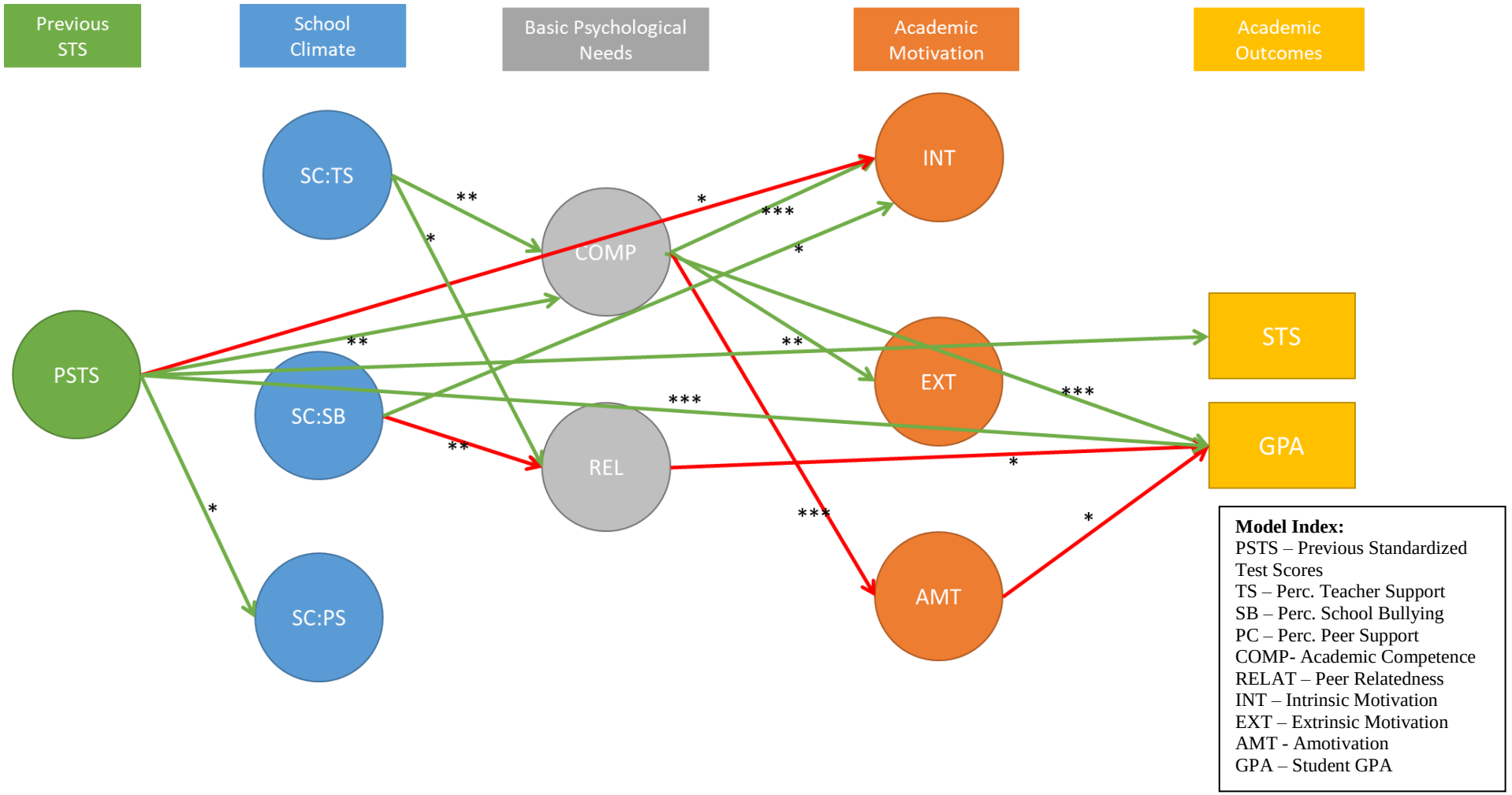


Figure 3. Middle and high school summary of pathways. Standardized coefficients (β) that are statistically significant $p<.05$ for four or more middle and high school grades are presented. One asterisk (*) represents pathways significant for four out of six middle and high school grades, two asterisks (**) represent pathways significant for five out of six grades, and three asterisks represents pathways significant for six out of six grades. Green arrows represent positive associations and red arrows represent negative associations.

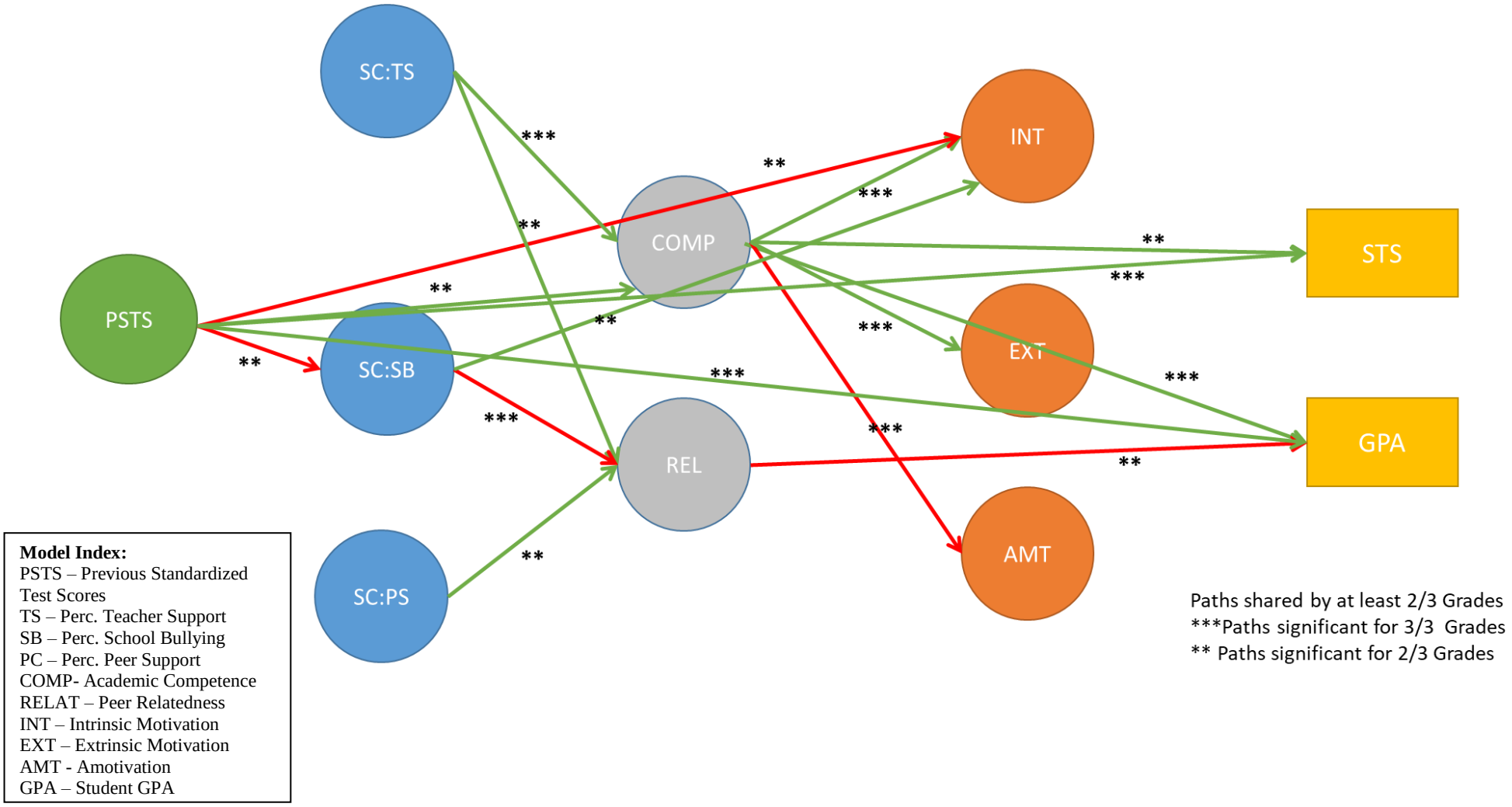


Figure 4. Middle school summary of pathways. Standardized coefficients (β) that are statistically significant $p<.05$ for two or more high school grades are presented. Two asterisks (**) represents pathways significant for two out of three grades and three asterisks (***) represent pathways significant for all high school grades. Green arrows represent positive associations and red arrows represent negative associations.

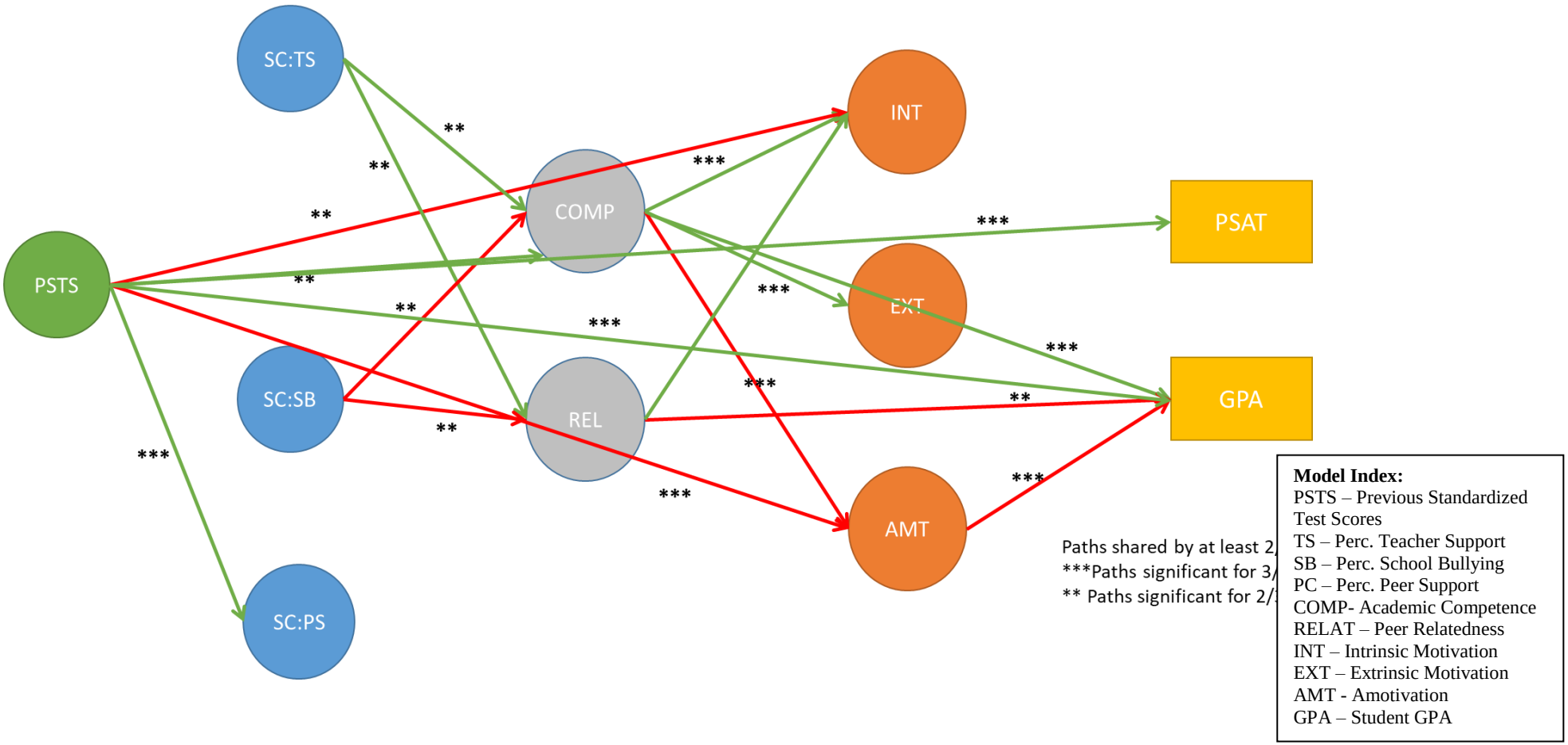


Figure 5. High school summary of pathways. Standardized coefficients (β) that are statistically significant p<.05 for two or more high school grades are presented. Two asterisks (**) represents pathways significant for two out of three grades and three asterisks (***) represent pathways significant for all high school grades. Green arrows represent positive associations and red arrows represent negative associations.

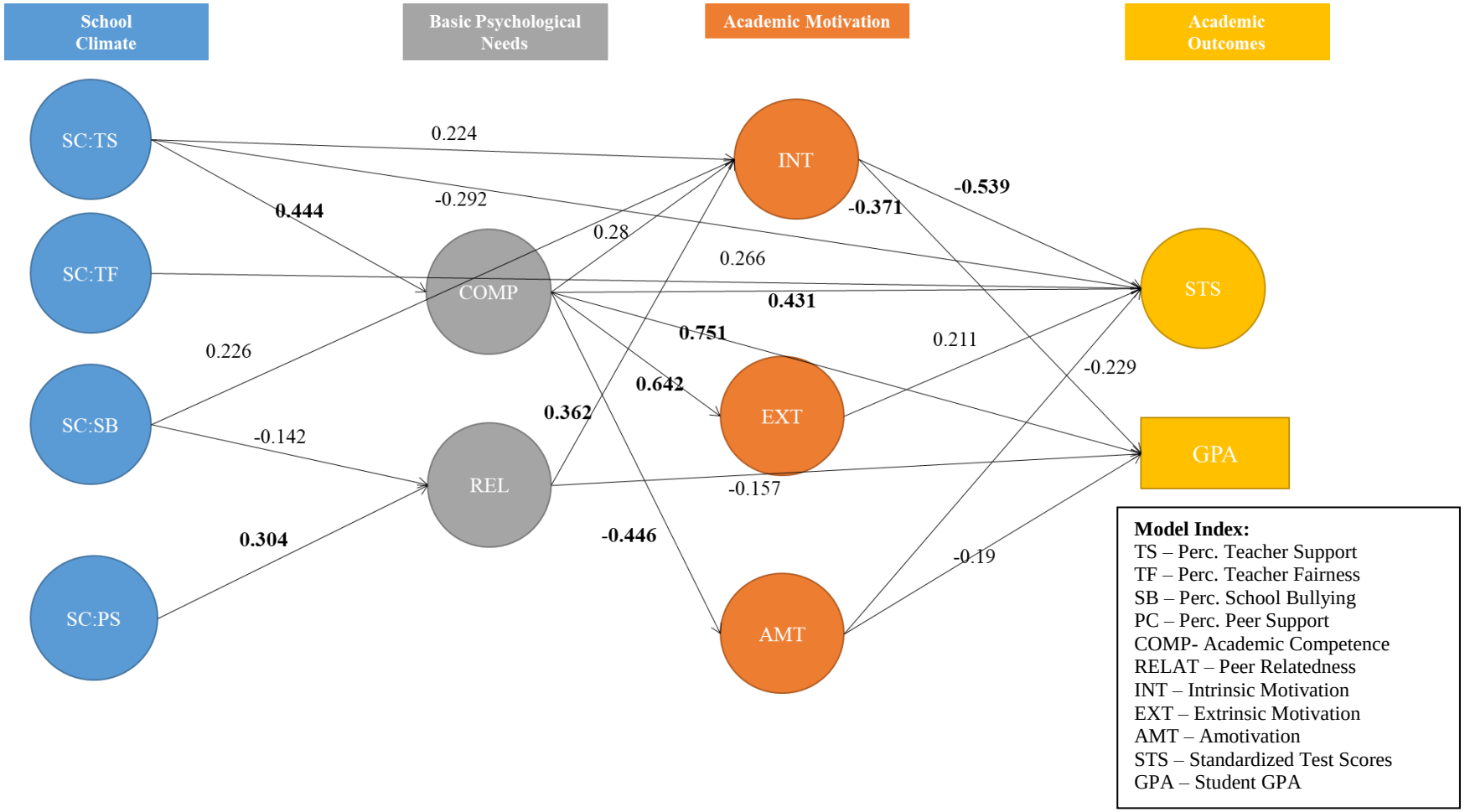


Figure 6. Sixth grade path model. Standardized coefficients (β) greater than .30 and significant at the p<.05 level are bolded. All within construct factors (e.g., school climate factors) were significantly correlated.

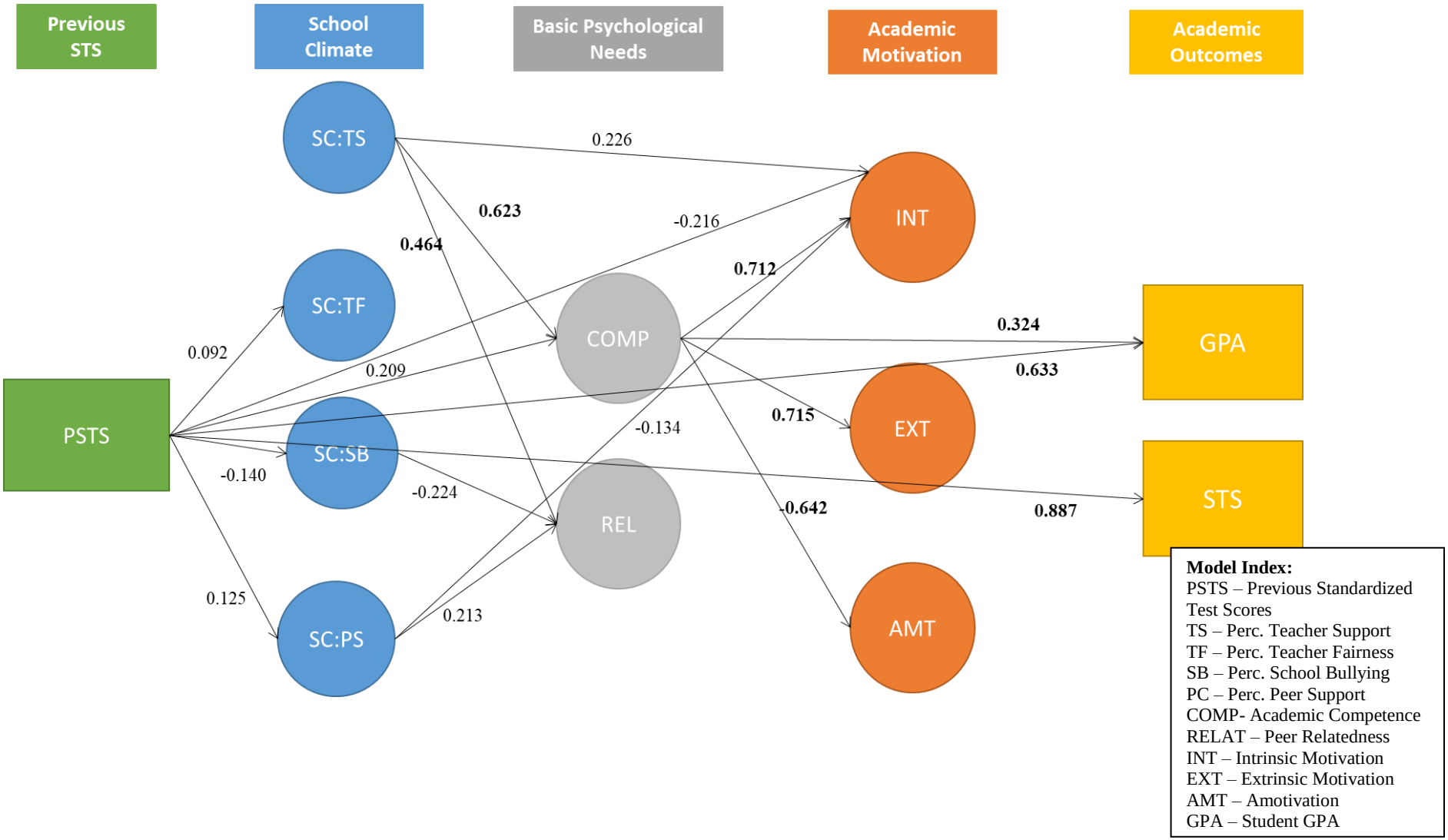


Figure 7. Seventh grade path model. Standardized coefficients (β) greater than .30 and significant at the p<.05 level are bolded. All within construct factors (e.g., school climate factors) were significantly correlated.

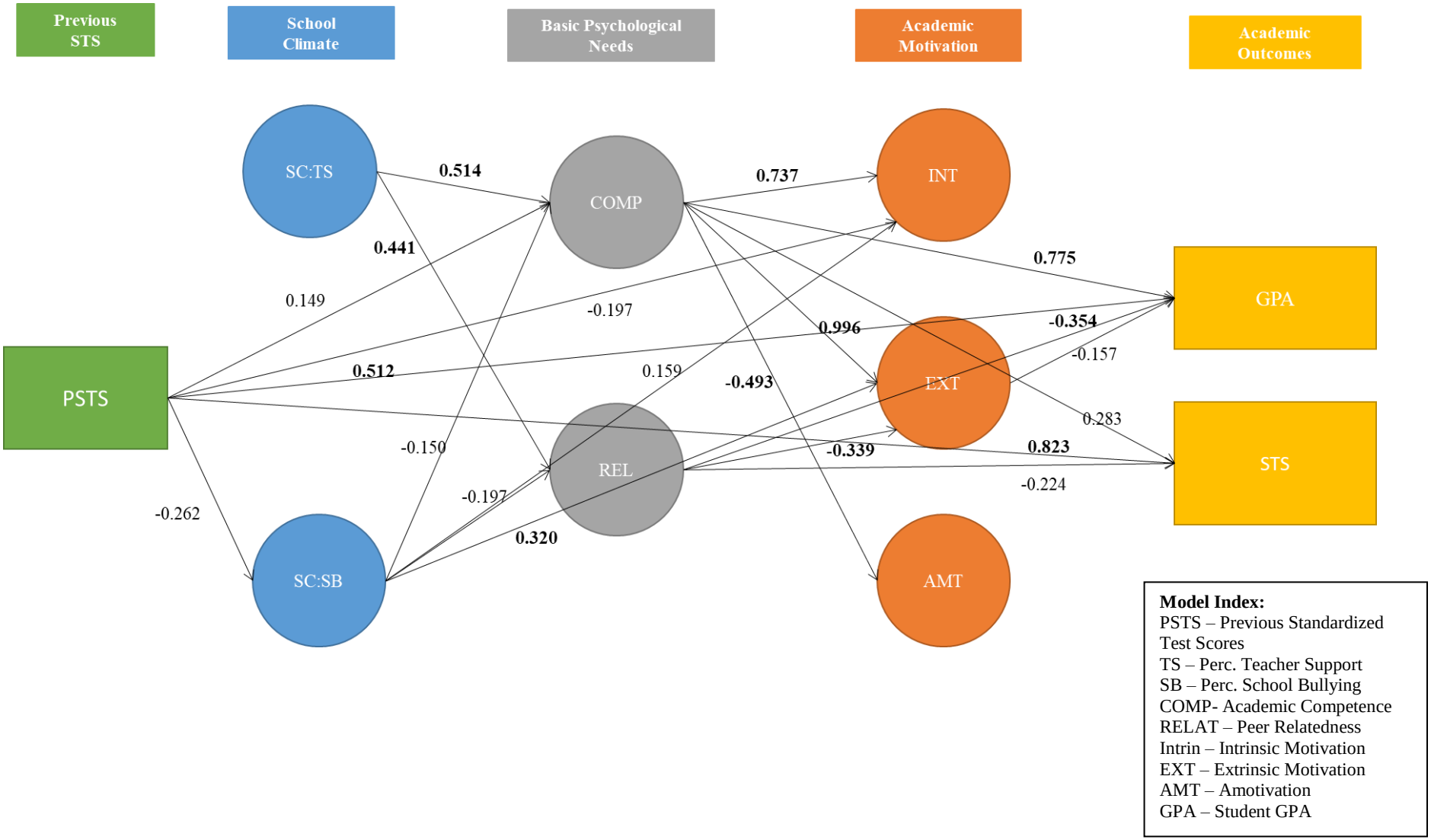


Figure 8. Eighth grade path model. Standardized coefficients (β) greater than .30 and significant at the p<.05 level are bolded. All within construct factors (e.g., school climate factors) were significantly correlated.

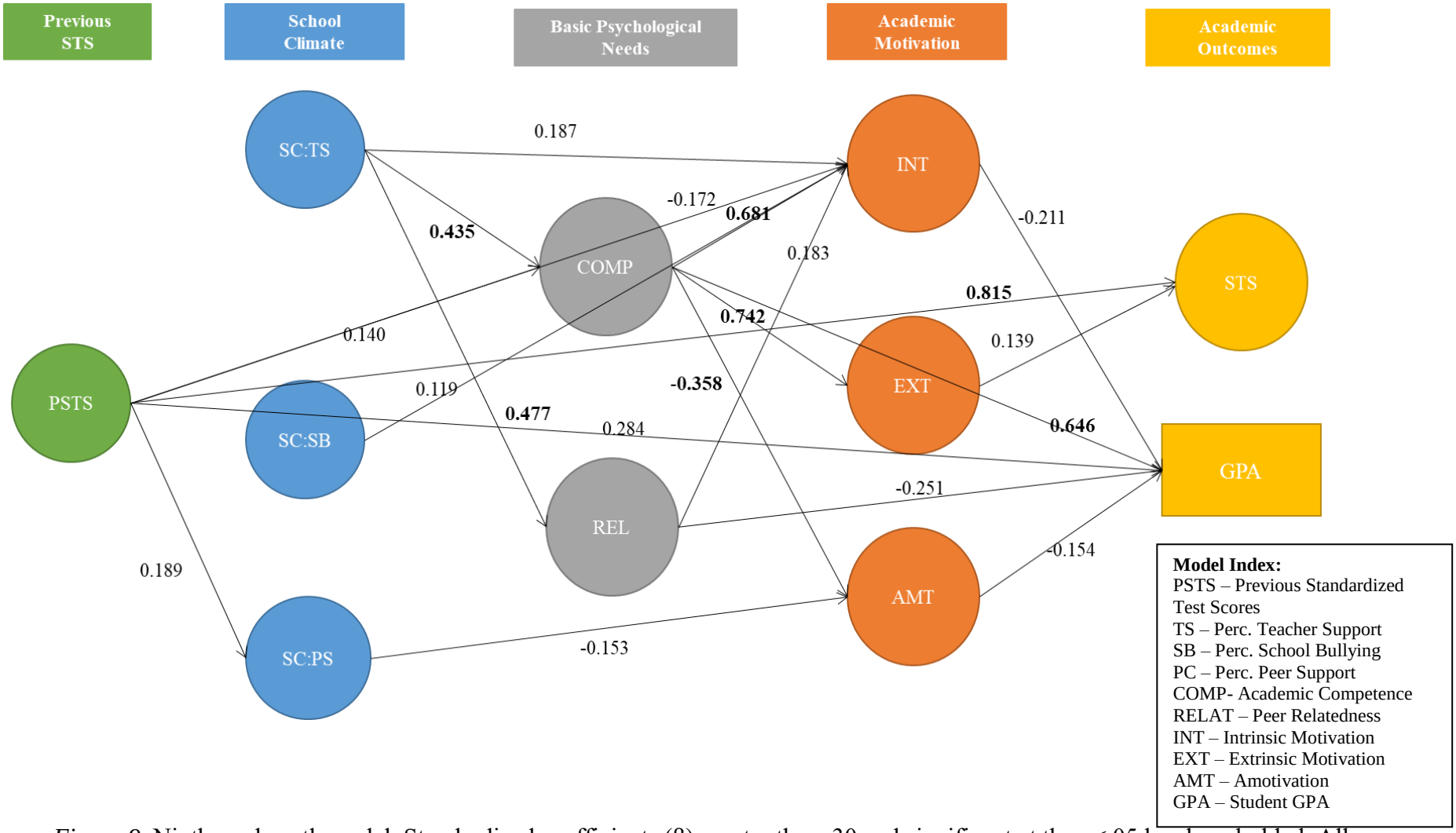


Figure 9. Ninth grade path model. Standardized coefficients (β) greater than .30 and significant at the p<.05 level are bolded. All within construct factors (e.g., school climate factors) were significantly correlated.

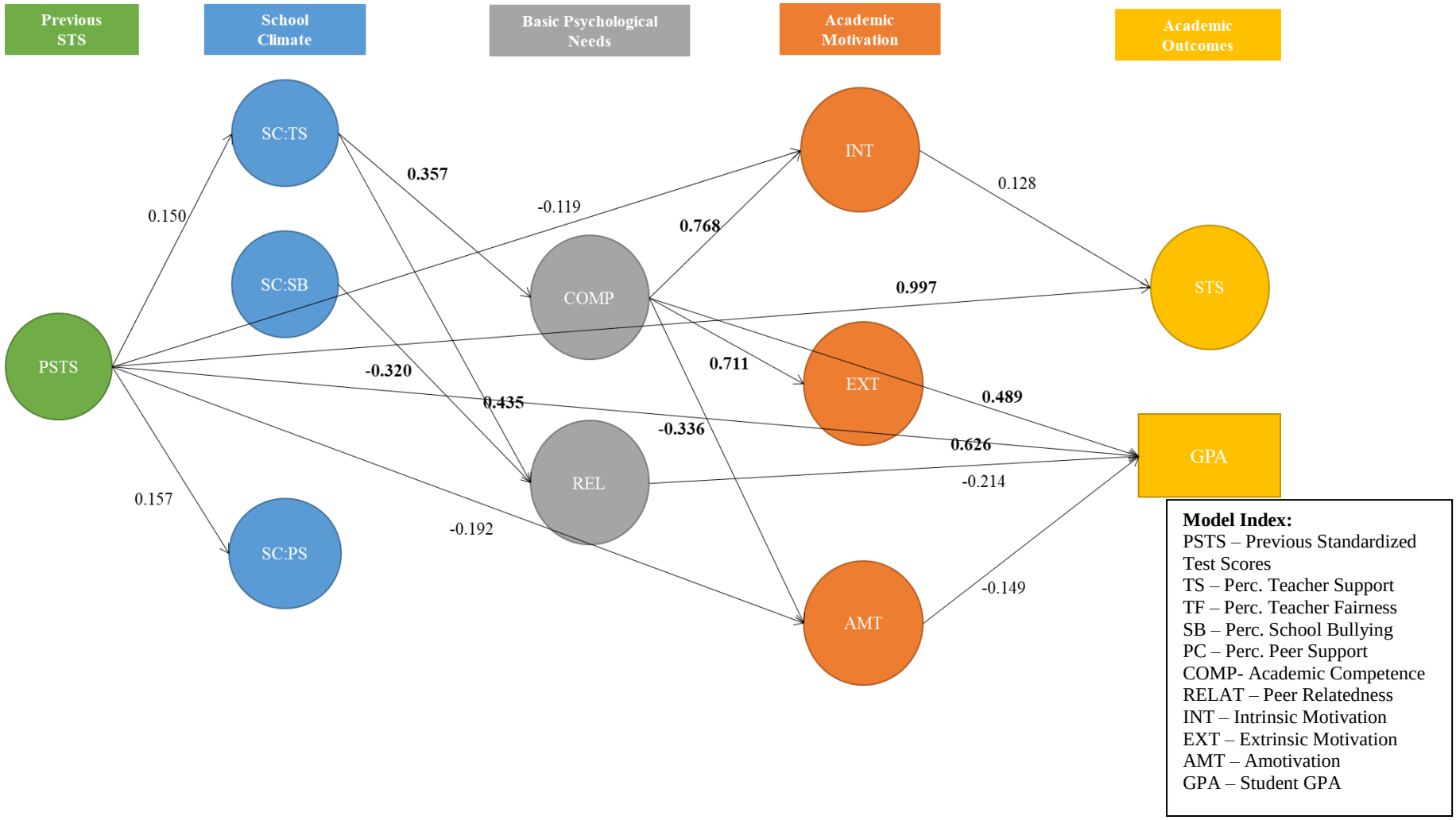


Figure 10. Tenth grade path model. Standardized coefficients (β) greater than .30 and significant at the p<.05 level are bolded. All within construct factors (e.g., school climate factors) were significantly correlated.

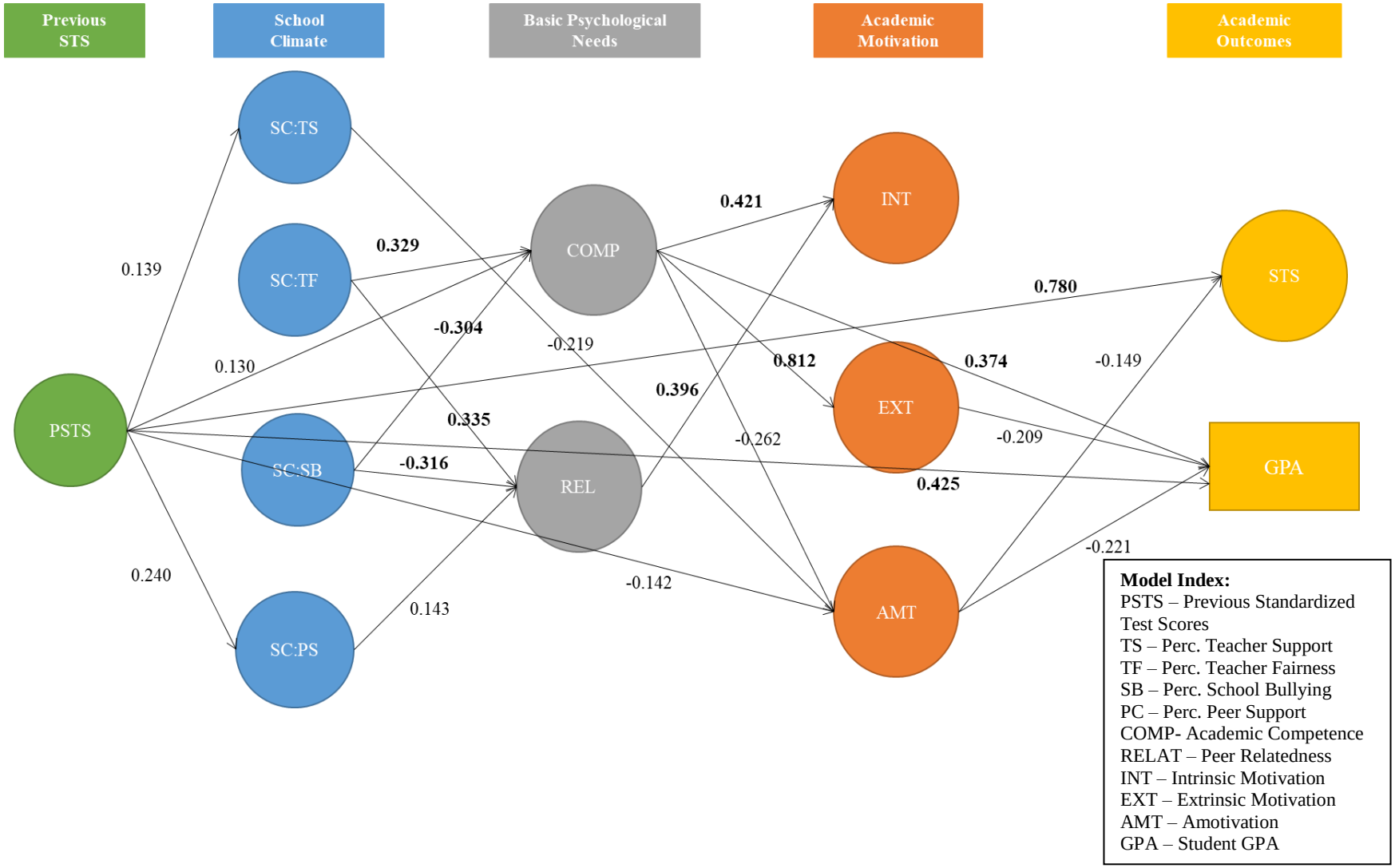
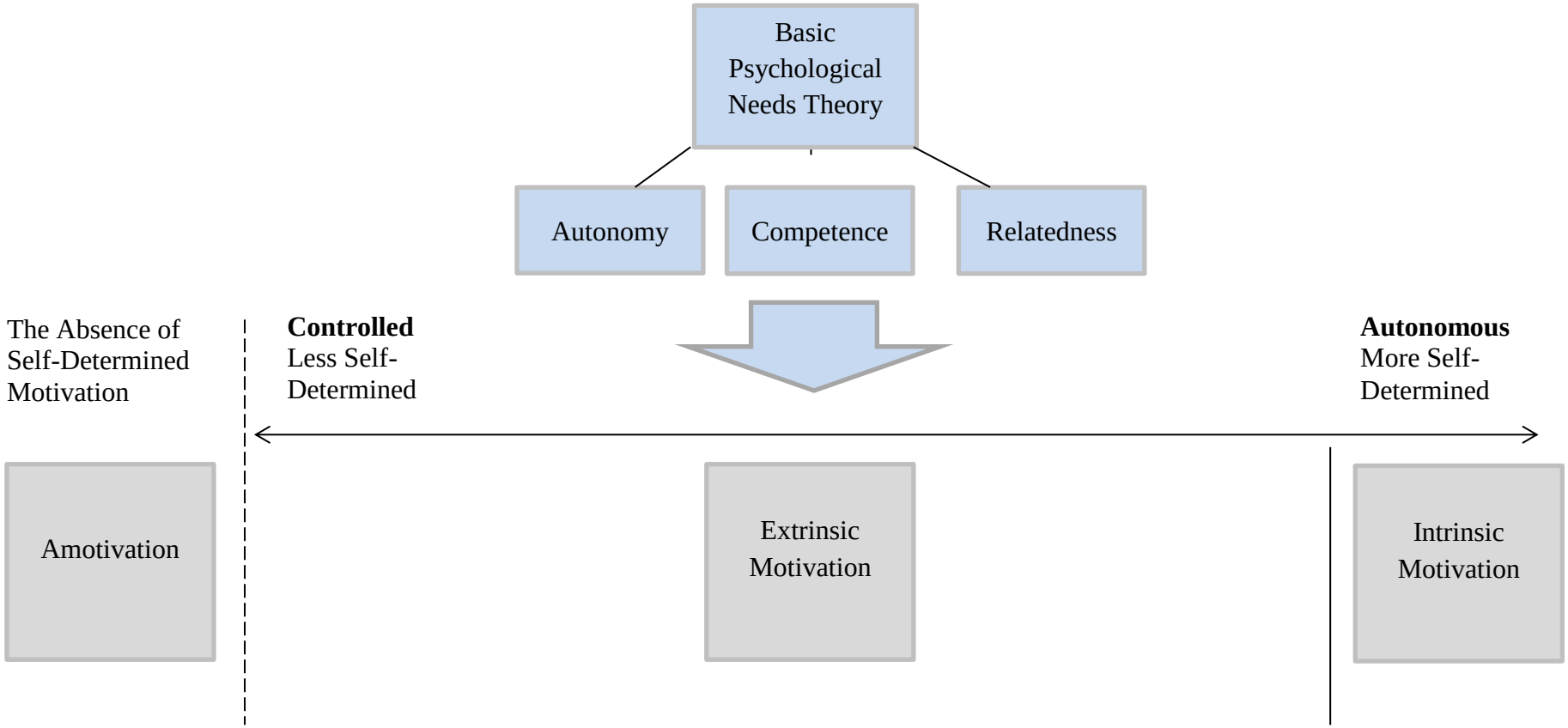


Figure 11. Eleventh grade path model. Standardized coefficients (β) greater than .30 and significant at the p<.05 level are bolded. All within construct factors (e.g., school climate factors) were significantly correlated.

APPENDIX A

Self-Determination Theory: Motivational Orientations Adapted from Ryan and Deci (2000)



APPENDIX B

Meriden School Climate Survey – Student Version

Please respond to each statement by indicating how much you agree with each statement. Use the following scale.

1 –*Never/ Strongly Disagree*	2- *Rarely/Disagree*	3- *Sometimes/Undecided*	4 – *Often/Agree*	5 – *Always/ Strongly Agree*

Factor 1 Teacher Support

q1 My teachers want me to work hard and do well
q3 There are teachers at my school who care about me
q7 At my school, there is a teacher or other adult whom I can trust
q13 At my school, there is a teacher or other adult who always wants me to do my best
q21 I try to do my best at school
q25 The teachers in my school make learning fun
q26 I am happy to be at this school
q30 There are teachers in my school that help me to really want to learn
q36 At my school, there is a teacher or other adult who tells me when I do a good job
q37 The adults in my school treat all students fairly
q40 The adults in my school treat students with respect
q42 My school handles student behavior problems fairly
q43 At my school, there is a teacher or other adult who listens to me when I have something to say

Factor 2 Perceived School Safety:

q2 I feel safe at school
q22 I worry about people being mean to me in school
q23 I feel safe on my way to and from school
q24 I feel sad in school
q33 Other students in my school hurt my feelings
q34 I get hit or threatened by other students
q35 Other students at school have spread mean rumors or lies about me

Factor 3 Respect for Differences

q10 Students in my school respect differences in other students (different ...)
q17 Other students in this school are polite and listen to what I say
q20 In class, I try to understand other students who disagree with me
q31 At school, the color of my skin can get me in trouble

q32	There is physical fighting between students at my school
q39	Students being mean to other students (harassment) is a problem in my school
q45	A person's skin color can cause problems at my school

Factor 4 Peers Support

q5	At my school, I have a friend who I can really trust
q9	When I have a problem, I find someone to talk with
q14	I have a friend about my own age that really cares about me
q19	I have a friend about my own age who talks with me about my problems

APPENDIX C

Basic Psychological Needs (adapted from Gagne´,2003; Johnston & Finney, 2010)

Please respond to each statement by indicating how much you agree with each statement. Use the following scale.

1 –*Strongly Disagree*	2- *Disagree*	3- *Somewhat Disagree*	4 – *Neither Agree nor Disagree*	5- *Somewhat Agree*	6- *Agree*	7- *Strongly Agree*

Factor 1 Academic Autonomy

g67 I feel that I can be myself at school.
g70 I feel free to express my ideas and opinions at school.
g72 I am in control of my school performance

Factor 2 Academic Competence

g66 I am a good student.
g69 My schoolwork gives me a sense of accomplishment.
g74 I am able to achieve my academic goals

Factor 3 Relatedness

g68 I fit in at school.
g71 I get along with others at school.
g73 I have similar interests to other students at my school

APPENDIX D

Academic Motivation Scale (adapted from Vallerand et al., 1992)

Please respond to each statement by indicating how much you agree with each statement. Use the following scale.

1 –*Strongly Disagree*	2- *Disagree*	3- *Somewhat Disagree*	4 – *Neither Agree nor Disagree*	5- *Somewhat Agree*	6- *Agree*	7- *Strongly Agree*

Factor 1 Intrinsic Motivation

g75 I go to school because I enjoy learning about my favorite subjects.

g78 I go to school because learning new things gives me a sense of satisfaction.

g81 I go to school because I find what we study at school interesting.

g84 I go to school because I get a satisfied feeling in finding out about new things.

Factor 2 Extrinsic Motivation

g77 I go to school in order to get a better job later on.

g80 I go to school because I want to lead a comfortable life later on.

g82 I go to school because if I left school, I would not find a job that pays enough.

g85 I go to school to have a better salary later.

Factor 3 Amotivation

g76 I don't care about how I do in school.

g79 School is not important to me.

g83 I don't understand why I am in school.

g86 I feel that I am wasting my time in school.

APPENDIX E

MSCS-SV CFA Alterations

A number of scale alterations were made to the MSCS-SV based on CFA results and for the purposes of this study. Based upon question wording and item correlation patterns, specific items from the teacher support factor were split to form an additional *Teacher Fairness* factor (3 items; see Appendix H). Additionally, for both the middle school and high school models, a number of items (q9, q13, q21, q25, q26,) were dropped due to theoretical issues with relevancy. Specifically, the wording for these items did directly not align with the construct of interest. One such example relates to item 21 (*I try to do my best at school*) which was deemed to be irrelevant to the construct of *Teacher Support*. In other instances, items were dropped due to low factor loadings (q1, q2, q10, q17, q20, q22, q23, q24) which suggested that they did not contribute to the construct of interest. Items q3 (*There are teachers at my school who care about me*) and q7 (*At my school, there is a teacher or other adult whom I can trust*) were correlated to a high degree relative to other within factor items (middle school r=0.53, high school r=0.57) and were deemed to be theoretically similar. Similarly, items q31 (*At school the color of my skin can get me in trouble*) and q45 (*A person's skin color can cause problems at my school*) were found to correlate to a relatively high degree for both the middle and high school samples (r=0.53, high school r=0.57) and were deemed to be theoretically similar. Based on these factors and the primary goal of including numerous items per factor as to maximize factor reliability, the decision was made to correlate item errors between these pairs of items, as opposed to dropping an item.

APPENDIX F

BPNS CFA Alterations

Specifically, fit statistics reflecting the three factor model suggested a poor model fit for both the middle and high school models (RMSEA >.08, CFI/TFI<.95, SRMR >.08). Due to a strong correlation between the autonomy and relatedness factors (r=.97), the decision was made to remove the autonomy factor from the model, but to retain particular item from the autonomy scale. Specifically, item 72 (e.g., *I am in control of my school performance)* was re-assigned from the autonomy scale to the academic competence scale, due to a both measurement factors and because it made theoretical sense to conceptualize a sense of control in as related to feeling academically competent. Autonomy item 70 (*I feel free to express my ideas and opinions at school)* was reassigned to the relatedness scale due to measurement reasons and because it made theoretical sense that feeling free to express oneself is related to feeling as if one connects with and/or gets along with others at school. Finally, item 69 on the academic competence scale (*My homework gives me a sense of accomplishment)* was dropped for theoretical purposes as this item was considered to assess a separate construct (e.g., feelings about task completion) rather than one's ability to complete tasks.

APPENDIX G

Meriden School Climate Survey – Student Version

Please respond to each statement by indicating how much you agree with each statement. Use the following scale.

1 –*Never/ Strongly Disagree*	2- *Rarely/Disagree*	3- *Sometimes/Undecided*	4 – *Often/Agree*	5 – *Always/ Strongly Agree*

Factor 1 Teacher Support

q3 There are teachers at my school who care about me

q7 At my school, there is a teacher or other adult whom I can trust

q30 There are teachers in my school that help me to really want to learn

q36 At my school, there is a teacher or other adult who tells me when I do a good job

q43 At my school, there is a teacher or other adult who listens to me when I have something to say

Factor 2 Teachers Fair:

q37 The adults in my school treat all students fairly

q40 The adults in my school treat students with respect

q42 My school handles student behavior problems fairly

Factor 2 Perceived School Safety:

q33 Other students in my school hurt my feelings

q34 I get hit or threatened by other students

q35 Other students at school have spread mean rumors or lies about me

Factor 3 Respect for Differences

q31 At school, the color of my skin can get me in trouble

q32 There is physical fighting between students at my school

q39 Students being mean to other students (harassment) is a problem in my school

q45 A person's skin color can cause problems at my school

Factor 4 Peers Support

q5 At my school, I have a friend who I can really trust

q14 I have a friend about my own age that really cares about me

q19 I have a friend about my own age who talks with me about my problems

APPENDIX H

Basic Psychological Needs (adapted from Gagne´,2003; Johnston & Finney, 2010)

Please respond to each statement by indicating how much you agree with each statement. Use the following scale.

1 –*Strongly Disagree*	2- *Disagree*	3- *Somewhat Disagree*	4 – *Neither Agree nor Disagree*	5- *Somewhat Agree*	6- *Agree*	7- *Strongly Agree*

Factor 1 Academic Competence

g66 I am a good student.
g72 I am in control of my school performance
g74 I am able to achieve my academic goals

Factor 2 Relatedness

g68 I fit in at school.
g70 I feel free to express my ideas and opinions at school.
g71 I get along with others at school.
g73 I have similar interests to other students at my school

APPENDIX I

Academic Motivation Scale (adapted from Vallerand et al., 1992)

Please respond to each statement by indicating how much you agree with each statement. Use the following scale.

1 –*Strongly Disagree*	2- *Disagree*	3- *Somewhat Disagree*	4 – *Neither Agree nor Disagree*	5- *Somewhat Agree*	6- *Agree*	7- *Strongly Agree*

Factor 1 Intrinsic Motivation

g75 I go to school because I enjoy learning about my favorite subjects.

g78 I go to school because learning new things gives me a sense of satisfaction.

g81 I go to school because I find what we study at school interesting.

g84 I go to school because I get a satisfied feeling in finding out about new things.

Factor 2 Extrinsic Motivation

g77 I go to school in order to get a better job later on.

g80 I go to school because I want to lead a comfortable life later on.

g82 I go to school because if I left school, I would not find a job that pays enough.

g85 I go to school to have a better salary later.

Factor 3 Amotivation

g76 I don't care about how I do in school.

g79 School is not important to me.

g83 I don't understand why I am in school.

g86 I feel that I am wasting my time in school.

APPENDIX J

Sixth Grade Latent Variable Correlations, Means, and Standard Deviations

	Perc. T. Support	Perc. T. Fairness	Perc. School Bullying	Perc. Respect for Diff.	Perc. Peer Support	Academic Competence	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation	Current STS	GPA
Teacher Support	1.00											
Teacher Fairness	0.84	1.00										
Perceived School Bullying	-0.38	-0.43	1.00									
Respect for Differences	-0.54	-0.63	0.72	1.00								
Peer Support	0.61	0.37	-0.33	-0.21	1.00							
Academic Competence	0.44	0.37	-0.17	-0.24	0.27	1.00						
Relatedness	0.24	0.18	-0.24	-0.17	0.35	0.76	1.00					
Intrinsic Motivation	0.35	0.26	0.01	-0.09	0.27	0.62	0.57	1.00				
Extrinsic Motivation	0.29	0.24	-0.11	-0.15	0.17	0.64	0.49	0.63	1.00			
Amotivation	-0.20	-0.17	0.08	0.11	-0.12	-0.45	-0.34	-0.42	-0.48	1.00		
Current STS	0.04	0.13	-0.12	-0.13	-0.04	0.31	0.17	-0.08	0.24	-0.28	1.00	
HSGPA	0.20	0.19	-0.10	-0.14	0.07	0.49	0.26	0.08	0.26	-0.32	0.80	1.00
Means	4.21	4.20	4.37	4.13	4.15	5.65	5.23	5.16	5.77	5.68	2498.62	2.25
Standard Deviation	0.72	0.84	0.79	0.74	0.84	1.14	1.18	1.35	1.08	1.40	95.42	0.81

Note: Items for the Perceived School Bullying, Respect for Differences, and Amotivation factors were reversed scored for the purpose of mean comparison

APPENDIX K

Seventh Grade Latent Variable Correlations, Means, and Standard Deviations

	Perc. T. Supp	Perc. T. Fairness	Perc. School Bullying	Perc. Respect for Diff.	Perc. Peer Support	Academic Competence	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation	Previous STS	Current STS	GPA
Perc. Teacher Support	1.00												
Perc. Teacher Fairness	0.85	1.00											
Perc. School Bullying	-0.28	-0.35	1.00										
Perc. Respect for Differences	-0.30	-0.43	0.69	1.00									
Perc. Peer Support	0.55	0.38	-0.20	0.00	1.00								
Academic Competence	0.62	0.55	-0.20	-0.19	0.37	1.00							
Relatedness	0.65	0.56	-0.42	-0.31	0.52	0.80	1.00						
Intrinsic Motivation	0.60	0.48	-0.15	-0.20	0.23	0.76	0.61	1.00					
Extrinsic Motivation	0.45	0.33	-0.15	-0.13	0.26	0.72	0.59	0.65	1.00				
Amotivation	-0.40	-0.44	0.13	0.12	-0.24	-0.64	-0.53	-0.59	-0.59	1.00			
Previous STS	0.00	0.09	-0.14	0.00	0.13	0.21	0.06	-0.08	0.15	-0.13	1.00		
Current STS	0.00	0.05	-0.13	0.00	0.11	0.19	0.03	-0.06	0.14	-0.12	0.89	1.00	
HSGPA	0.20	0.24	-0.16	-0.06	0.20	0.46	0.24	0.16	0.32	-0.30	0.70	0.74	1.00
Means	4.02	3.99	4.35	3.89	4.21	5.54	5.18	4.91	5.55	5.39	2494.89	2524.08	2.25
Standard Deviation	0.82	0.83	0.74	0.75	0.83	1.09	1.19	1.47	1.15	1.37	98.29	101.47	0.82

Note: Items for the Perceived School Bullying, Respect for Differences, and Amotivation factors were reversed scored for the purpose of mean comparison

APPENDIX L

Eighth Grade Latent Variable Correlations, Means, and Standard Deviations

	Perc. T. Supp	Perc. T. Fairness	Perc. School Bullying	Perc. Respect for Diff.	Perc. Peer Support	Academic Comp.	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation	Previous STS	Current STS	GPA
Perc. Teacher Support	1.00												
Perc. Teacher Fairness	0.80	1.00											
Perc. School Bullying	-0.13	-0.21	1.00										
Perc. Respect for Differences	-0.24	-0.49	0.55	1.00									
Perc. Peer Support	0.59	0.28	0.00	-0.10	1.00								
Academic Competence	0.53	0.44	-0.26	-0.21	0.30	1.00							
Relatedness	0.47	0.39	-0.26	-0.22	0.26	0.83	1.00						
Intrinsic Motivation	0.37	0.29	0.02	-0.07	0.22	0.66	0.56	1.00					
Extrinsic Motivation	0.33	0.24	0.15	0.04	0.21	0.63	0.40	0.47	1.00				
Amotivation	-0.26	-0.22	0.13	0.10	-0.15	-0.49	-0.41	-0.41	-0.44	1.00			
Previous STS	0.00	0.00	-0.26	0.00	0.00	0.19	0.05	-0.10	0.09	-0.09	1.00		
Current STS	0.05	0.04	-0.23	-0.01	0.03	0.25	0.05	-0.06	0.16	-0.15	0.87	1.00	
HSGPA	0.20	0.17	-0.27	-0.09	0.11	0.48	0.25	0.15	0.24	-0.28	0.63	0.72	1.00
Means	3.78	3.83	4.14	3.73	3.97	5.37	4.93	4.54	5.49	5.37	2491.23	2518.28	2.26
Standard Deviation	0.78	0.79	0.84	0.80	0.87	1.12	1.23	1.41	1.07	1.38	99.93	102.57	0.95

Note: Items for the Perceived School Bullying, Respect for Differences, and Amotivation factors were reversed scored for the purpose of mean comparison

APPENDIX M

Ninth Grade Latent Variable Correlations, Means, and Standard Deviations

	Perc. T. Supp	Perc. T. Fairness	Perc. School Bullying	Perc. Respect for Diff.	Perc. Peer Support	Academic Comp.	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation	Previous STS	Current STS	GPA
Perc. Teacher Support	1.00												
Perc. Teacher Fairness	0.83	1.00											
Perc. School Bullying	-0.32	-0.36	1.00										
Perc. Respect for Differences	-0.36	-0.51	0.79	1.00									
Perc. Peer Support	0.56	0.34	-0.14	-0.16	1.00								
Academic Competence	0.44	0.37	-0.13	-0.15	0.27	1.00							
Relatedness	0.48	0.40	-0.15	-0.17	0.27	0.83	1.00						
Intrinsic Motivation	0.44	0.35	-0.04	-0.08	0.24	0.72	0.63	1.00					
Extrinsic Motivation	0.33	0.28	-0.10	-0.11	0.20	0.74	0.62	0.53	1.00				
Amotivation	-0.25	-0.19	0.07	0.08	-0.25	-0.40	-0.34	-0.37	-0.41	1.00			
Previous STS	0.06	0.08	0.05	0.04	0.19	0.17	0.03	-0.04	0.12	-0.09	1.00		
Current STS	0.10	0.11	0.03	0.02	0.18	0.24	0.11	0.04	0.24	-0.13	0.83	1.00	
HSGPA	0.13	0.12	-0.04	-0.04	0.15	0.40	0.21	0.14	0.31	-0.28	0.41	0.66	1.00
Means	3.94	3.94	4.43	3.97	4.10	5.45	5.17	4.69	5.47	5.33	385.81	406.08	2.83
Standard Deviation	0.73	0.79	0.73	0.78	0.78	1.13	1.17	1.41	1.16	1.40	79.88	85.11	1.07

Note: Items for the Perceived School Bullying, Respect for Differences, and Amotivation factors were reversed scored for the purpose of mean comparison, thus higher scores across on these/all factors would be considered more positive.

APPENDIX N

Tenth Grade Latent Variable Correlations, Means, and Standard Deviations

	Perc. T. Supp	Perc. T. Fairness	Perc. School Bullying	Perc. Respect for Diff.	Perc. Peer Support	Academic Comp.	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation	Previous STS	Current STS	GPA
Perc. Teacher Support	1.00												
Perc. Teacher Fairness	0.78	1.00											
Perc. School Bullying	-0.17	-0.14	1.00										
Perc. Respect for Differences	-0.36	-0.47	0.67	1.00									
Perc. Peer Support	0.54	0.27	-0.18	-0.15	1.00								
Academic Competence	0.36	0.28	-0.06	-0.13	0.19								
Relatedness	0.44	0.34	-0.07	-0.15	0.24	0.81	1.00						
Intrinsic Motivation	0.26	0.20	-0.05	-0.09	0.13	0.76	0.61	1.00					
Extrinsic Motivation	0.25	0.20	-0.04	-0.09	0.19	0.71	0.57	0.54	1.00				
Amotivation	-0.15	-0.11	0.01	0.05	-0.10	-0.35	-0.28	-0.24	-0.25	1.00			
Previous STS	0.14	0.09	0.05	-0.03	0.16	0.05	0.06	-0.08	0.04	-0.21	1.00		
Current STS	0.17	0.12	0.05	-0.04	0.20	0.15	0.14	0.05	0.14	-0.24	0.99	1.00	
HSGPA	0.19	0.14	0.02	-0.06	0.18	0.40	0.26	0.23	0.26	-0.39	0.67	0.73	1.00
Means	3.75	4.45	3.71	4.07	5.36	5.07	4.63	5.56	5.28	5.33	418.57	429.27	2.76
Standard Deviation	0.76	0.76	0.82	0.86	1.13	1.21	1.30	1.19	1.38	1.40	75.76	81.05	0.98

Note: Items for the Perceived School Bullying, Respect for Differences, and Amotivation factors were reversed scored for the purpose of mean comparison, thus higher scores across on these/all factors would be considered more positive.

APPENDIX O

Eleventh Grade Latent Variable Correlations, Means, and Standard Deviations

	Perc. T. Supp	Perc. T. Fairness	Perc. School Bullying	Perc. Respect for Diff.	Perc. Peer Support	Academic Competence	Relatedness	Intrinsic Motivation	Extrinsic Motivation	Amotivation	Previous STS	Current STS	GPA
Perc. Teacher Support	1.00												
Perc. Teacher Fairness	0.81	1.00											
Perc. School Bullying	-0.01	-0.05	1.00										
Perc. Respect for Differences	-0.17	-0.32	0.69	1.00									
Perc. Peer Support	0.55	0.30	-0.02	0.01	1.00								
Academic Competence	0.29	0.35	-0.33	-0.31	0.13	1.00							
Relatedness	0.35	0.39	-0.34	-0.33	0.25	0.83	1.00						
Intrinsic Motivation	0.26	0.30	-0.27	-0.26	0.15	0.75	0.75	1.00					
Extrinsic Motivation	0.23	0.29	-0.27	-0.25	0.11	0.81	0.68	0.61	1.00				
Amotivation	-0.31	-0.28	0.10	0.11	-0.19	-0.35	-0.31	-0.27	-0.37	1.00			
Previous STS	0.14	0.06	-0.07	0.06	0.24	0.17	0.08	0.10	0.14	-0.22	1.00		
Current STS	0.16	0.09	-0.07	0.03	0.22	0.19	0.11	0.12	0.16	-0.32	0.81	1.00	
GPA	0.19	0.16	-0.12	-0.06	0.17	0.36	0.27	0.23	0.24	-0.37	0.72	0.51	1.00
Means	3.76	3.81	4.51	3.75	4.06	5.42	5.13	4.81	5.46	5.21	437.08	461.78	2.76
Standard Deviation	0.82	0.79	0.74	0.79	0.87	1.20	1.29	1.37	1.23	1.36	86.62	90.20	0.98

Note: Items for the Perceived School Bullying, Respect for Differences, and Amotivation factors were reversed scored for the purpose of mean comparison, thus higher scores across on these/all factors would be considered more positive